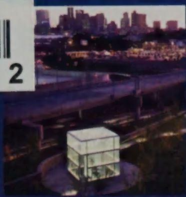
Boston-Logan International Airport




2009 EDR
Environmental Data Report

EOEA #3247
September 2010

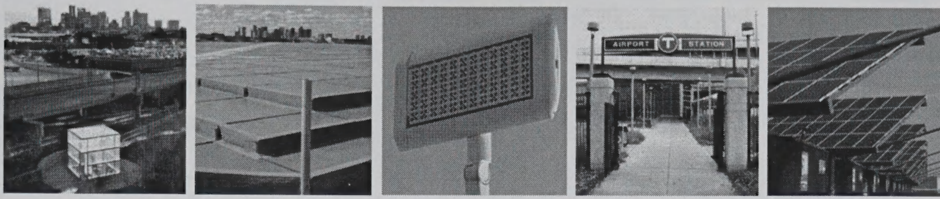
SUBMITTED TO:
Executive Office of Energy and Environmental Affairs, MEPA Office

SUBMITTED BY:
Massachusetts Port Authority
Economic Planning & Development

PREPARED BY:
VHB Vanasse Hangen Brustlin, Inc.

IN ASSOCIATION WITH:
Harris Miller Miller & Hanson, Inc.
KB Environmental Sciences, Inc.
Simat, Helliesen & Eichner, Inc.

Boston-Logan International Airport



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printed on recycled paper

massport
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909
Telephone (617) 568-5000
www.massport.com

September 30, 2010

The Honorable Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: *Logan Airport 2009 Environmental Data Report* (*2009 EDR*) - EOEA #3247

Dear Secretary Bowles:

On behalf of the Massachusetts Port Authority (Massport), I am pleased to submit for your review, the *Boston-Logan International Airport 2009 Environmental Data Report* (*2009 EDR*). 2009 continued to show improvements in a number of environmental areas through a combination of fewer flight operations in cleaner and quieter aircraft and a range of Massport and tenant programs aimed at increasing operating efficiencies and reducing impacts. *Chapter 1, Introduction/Executive Summary* of this EDR has expanded the discussion of airport sustainability initiatives.

In 2009, passenger levels continued to show a decline from the all-time high of 28.1 million in 2007. Effects of the global economic recession continued to affect Logan Airport, although the decrease was less severe than the drop in the overall U.S. market. Total aircraft operations at Logan Airport also decreased, though by a slightly smaller percentage than passengers. As outlined below, this *2009 EDR* considers the continuing effects of airlines operating much more efficiently and flying more passengers with fewer aircraft operations, and the associated reduction in ground access activities. While these changes often yield environmental benefits, we recognize that as the economy and aviation industry recover, Massport anticipates increases in activity levels and some increases in environmental effect. As described throughout the *2009 EDR*, Massport remains fully committed to minimizing those effects.

Content and Structure

The *2009 EDR* responds fully to the Secretary's Certificate on the *Boston-Logan International Airport 2008 EDR* and reports on the status of airport operations, environmental conditions, and Massport milestones achieved in 2009. Where relevant, the document also provides updates on more recent Logan activities. The document incorporates comments made on the *2008 EDR* and consists of a single volume reporting on the following 2009 categories:

- Highlights for 2009, including an expanded overview of sustainability initiatives at Logan Airport;
- Passenger levels, aircraft operations, aircraft fleets and cargo volumes;
- Planning, design and construction activities at Logan Airport;
- Regional transportation;
- Key environmental indicators (Ground Transportation, Noise Abatement, Air Quality/Emissions Reduction, and Water Quality/Environmental Compliance and Management);
- Mitigation status of Logan Airport projects;
- Secretary's Certificate on the *Boston-Logan International Airport 2008 EDR* and other comment letters received on the *2008 EDR*;
- Individual responses to comments received on the *2008 EDR;*
- Proposed scope for the *2010 EDR;*
- Distribution list; and
- Supporting technical appendices.

Review Period, Distribution, and Consultation

A 30-day public comment period for the *2009 EDR* will begin on October 6, 2010, the publication date of the next Environmental Monitor, and will end on November 5, 2010. The distribution list included as Appendix D indicates that all parties on the distribution list will be sent a copy of the *2009 EDR* on CD. A smaller number of reviewers will be sent hard copies of the *2009 EDR*. The full *2009 EDR* will also be available on Massport's website (www.massport.com).

A MEPA consultation session on the *2009 EDR* is scheduled for 4:00 PM on October 20, 2010, at the Logan Office Center, One Harborside Drive, East Boston (Logan Airport). Additional copies of the *2009 EDR* can be obtained by contacting Laurie Goodrich at (617) 568-3507 during the 30-day public comment period.

Future Filings and Timing

Starting in 1997, Massport followed a five-year filing cycle for the *EDRs* and *Environmental Status and Planning Reports (ESPRs)*, with EDRs being filed for each year between the ESPRs. As noted in the 2008 EDR, the last Logan ESPR was filed for calendar year 2004. Following the recent sequence of annual environmental filings, the 2009 report was previously anticipated to be in the form of an ESPR rather than an EDR. However, due to the ongoing global economic downturn, as described in this *2009 EDR*, activity levels at Logan Airport and associated environmental impacts continue to remain well below historic levels and recent peaks. In 2010, near-term activity levels and associated environmental effects appear to remain well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the *2004 ESPR*—the predicate upon which the ESPR schedule was initially established —has not occurred. Accordingly, Massport proposes to prepare a *2010 EDR* followed by a *2011 ESPR*.

Several factors have influenced Massport's request to defer the next Logan ESPR to reflect analysis of calendar year 2011. Because of the continued dampening of worldwide aviation activity, Massport has elected to update its current passenger and operations forecast. The next forecast will be broader in scope and include new forecasts for Hanscom Field and the recently acquired Worcester Regional Airport. The new forecasts will use 2011 as the base year and develop and project forward for calendar years 2020 and 2030. In addition, Massport recently completed data collection for its detailed 2010 Logan Air Passenger Survey, a key tool in understanding how passengers access Logan Airport. We have also conducted a number of focused surveys to gather information on new economy commercial parking and Logan Express passenger and employee user trends. Together with the new system-wide forecasts, the surveys provide a new and superior foundation for longer-range ground access planning and overall updated Logan facility planning. We believe that a *2011 ESPR* is the best tool to present the revised forecasts, updated ground access planning and a broader vision of how the three Massport airports are likely to function in the future.

As we have done in the past, Massport will continue to identify and discuss any longer term aviation and environmental trends in *2010 EDR* as work on the *2011 ESPR* proceeds. A proposed scope for the *2010 EDR* is included as Appendix C of this current filing.

Massport hopes that you and other reviewers of the *2009 EDR* find the document informative and complete. We look forward to your review of this document and to close consultation with you and other reviewers in the coming weeks. Please feel free to contact me at (617) 568-3524 if you have any questions.

Very truly yours,

Stewart Dalzell

Stewart Dalzell
Deputy Director, Environmental Planning and Permitting

cc: *2009 EDR* Distribution List (Appendix D in the *2009 EDR*)
Janeen Hansen/Massport

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Introduction/ Executive Summary

Introduction

Boston-Logan International Airport (Logan Airport or Airport), owned and operated by the Massachusetts Port Authority (Massport), is New England's primary international and domestic airport. This *Boston-Logan International Airport 2009 Environmental Data Report (2009 EDR)* is one of a series of annual environmental review documents submitted to the Massachusetts Environmental Policy Act (MEPA)[1] Office since 1989 to report on the cumulative environmental effects of Logan Airport's operations and activities. EDRs provide a review of environmental conditions for the reporting year compared to the previous year. Approximately every five years, Massport also prepares Environmental Status and Planning Reports (ESPRs), which provide an historical and prospective view of Logan Airport. For over 20 years, Massport has, through its EDRs and ESPRs, and the MEPA process, provided an annual update on Logan Airport's environmental achievements for public and agency review and comment.

The scope for this *2009 EDR* was established by the Secretary of the Executive Office of Energy and Environmental Affairs' (EEA) Certificate dated November 13, 2009, which is included in *Appendix A, MEPA Certificate and Responses to Comments*. This *2009 EDR* updates and compares the data presented in the *2008 EDR*, and presents activity levels (including aircraft operations and passenger activity) and environmental conditions at Logan Airport for calendar year 2009. To enhance the usefulness of the *2009 EDR* as a reference document for reviewers, this *2009 EDR* also presents historic data on the environmental conditions at Logan Airport dating back to 1990 in instances where historical information is available. Historical data are generally included in the technical appendices. In *Chapter 1, Introduction/Executive Summary,* an overview of Massport's sustainability initiatives is provided. *Chapter 3, Airport Planning* provides an update on the projects underway or being considered by Massport at Logan Airport in 2009. *Chapter 9, Project Mitigation Tracking* describes the status of project mitigation measures.

1 Massachusetts General Laws Chapter 30, Sections 61-62H. MEPA is implemented by regulations published at 301 Code of Massachusetts Regulations (CMR) 11.00 (the "MEPA Regulations").

EOEA # 3247

Submitted By

Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting
(617) 568-3524

Lowell Richards, Director
Economic Planning and Development
(617) 568-1016

Janeen S. Hansen, Senior Project Manager
Economic Planning and Development
(617) 568-3113

Logan Airport Environmental Review Process

This *2009 EDR* is part of a two-decade long, progressive state-level environmental review process that assesses Logan Airport's cumulative environmental impacts. The process provides a context against which individual airport projects meeting state and federal environmental review thresholds are evaluated on a project-specific basis. The Airport-wide and project-specific environmental review processes are described below.

Logan Airport-Wide Review

In 1979, the Secretary of the then-Executive Office of Environmental Affairs (EOEA) (now the EEA) issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the Airport through a Generic Environmental Impact Report (GEIR). The Certificate also required interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR evolved into an effective planning tool for Massport and provided projections of environmental conditions so that the cumulative effects of individual projects could be evaluated within a broader context.

EOEA eliminated GEIRs following the 1998 revisions to its MEPA Regulations. However, the Secretary's Certificate on the *1997 Annual Update*[2] proposed a revised environmental review process for Logan Airport. As a result, Massport has evaluated the cumulative impacts associated with Logan Airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs. The next EDR will be filed in 2011 and will report on the 2010 calendar year. Following the recent sequence of Logan Airport annual environmental filings, this *2009 EDR* was previously anticipated to be in the form of an ESPR rather than an EDR.

As described in this *2009 EDR*, activity levels and associated environmental effects remain well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the *2004 ESPR*-the predicate upon which the ESPR schedule was initially established-has not occurred. Accordingly, Massport prepared a *2009 EDR* in lieu of the scheduled ESPR. In addition, Massport proposes to prepare a *2010 EDR*,

2 Certificate of the Secretary of the Executive Office of Environmental Affairs on the *Logan Airport 1997 Annual Update*, issued on October 16, 1998.

which reports on 2010 activity levels and environmental conditions. The next anticipated ESPR will report on calendar year 2011. The *2011 ESPR* will report on updated passenger activity level and aircraft operations forecasts. Where appropriate, Massport will continue to identify and address any longer-term aviation and environmental trends in each annual filing whether that be in the form of an EDR or ESPR.

Project-Specific Review

While this Airport-wide review provides the broad planning context for proposed projects and future planning concepts, Airport projects are also subject to a project-specific, public environmental review process when state environmental review thresholds are met. When required, Massport and Airport tenants submit Environmental Notification Forms (ENFs) and Environmental Impact Reports (EIRs) pursuant to MEPA.

Similarly, where National Environmental Policy Act (NEPA)[3] environmental review is triggered, projects are reviewed under the Federal Aviation Administration (FAA) environmental review process.

Overview of Logan Airport

Logan Airport is New England's primary domestic and international airport. Logan Airport is an origin-destination airport, not a connecting hub for major airlines. The Airport plays a key role in the metropolitan Boston and New England passenger and freight transportation networks and is a significant contributor to the regional economy. In 2004, Logan Airport employed a total of approximately 12,000 people (a full time equivalency of 10,879 jobs) and activities associated with the Airport contributed an average of \$19 million a day into the local economy.[4] In 2009, Logan Airport was the 22nd busiest commercial aviation facility in North America ranked by aircraft operations, and the 20th busiest in North America ranked by number of passengers.[5]

The Airport boundary encompasses approximately 2,400 acres in East Boston and Winthrop, including 700 acres underwater in Boston Harbor. Logan Airport, shown in Figures 1-1 and 1-2, is one of the most land-constrained airports in the nation and is surrounded on three sides by Boston Harbor.

Logan Airport is close to downtown Boston and is accessible by public transit and a well-connected roadway system. The airfield comprises six runways, approximately 15 miles of taxiway, and approximately 240 acres of concrete and asphalt apron. Logan Airport has four passenger terminals (Terminal A, B, C and E), each with its own ticketing, baggage claim, and ground transportation facilities. Massport continues to evaluate and implement enhancements to Logan Airport's security, operational efficiency, and accessibility to and from the Boston metropolitan area, while carefully monitoring the environmental effects of Logan Airport operations.

3 42 USC Section 4321 et seq. The Federal Aviation Administration implements NEPA through *Federal Aviation Administration Order 1050.1E, Environmental Impacts: Policies and Procedures*, Federal Aviation Administration, United States Department of Transportation, Effective Date: March 20, 2006.
4 *Economic Impact Report 2006*, Massachusetts Port Authority, 2006.
5 *ACI-NA Airport Traffic Reports 2009 at www.aci-na.org/stats/stats_traffic accessed July 2010.*

Figure 1-1 Aerial View of Logan Airport

Figure 1-2 Logan Airport

Source: U.S. Geological Service.

2009 Highlights and Accomplishments

This section provides a brief overview of key events and accomplishments at Logan Airport in 2009. Additional information concerning all aspects of Airport activities is provided in subsequent chapters.

Activity Levels

- The total number of air passengers at Logan Airport during 2009 dropped to 25.5 million, compared to 26.1 million in 2008. The decrease in the total number of air passengers was 2.3 percent, compared to a decrease of 7.1 percent in the previous year. The 2009 decrease was less severe than the drop in the overall U.S. trend for air passengers, which fell by 5.3 percent in 2009. The decreases in passenger traffic and aircraft operations reflect national trends resulting from the worsening global economic recession and the sharp decline in air travel demand.
- The total number of aircraft operations declined from 371,604 in 2008 to 345,306 in 2009, a decrease of 7.1 percent. Passenger aircraft operations decreased by 3.8 percent. Operations by general aviation (GA) aircraft declined by a dramatic 48.6 percent in 2009. Cargo operations decreased by 23.2 percent in 2009, compared to 2008.
- The number of air passengers per aircraft operation increased, from an average of 70.2 passengers per aircraft operation in 2008 to an average of 73.9 passengers per aircraft operation in 2009. The passenger load factor (the percentage of seats occupied by revenue passengers) also increased slightly from 72.8 to 72.9. This reflects greater air carrier efficiency.
- While legacy airlines, such as Delta Air Lines, Continental Airlines, and US Airways, reduced aircraft operations significantly at Logan Airport, low-cost carriers (LCCs) operations increased by 12.3 percent. In addition to a continuing expansion in service offerings by JetBlue Airways, Logan Airport saw operations for two new LCCs, Southwest Airlines and Virgin America, begin in 2009.
- Air cargo volumes declined 12.1 percent from 621 million pounds in 2008 to 546 million pounds in 2009. The largest volume decrease occurred in the express/small packages segment.

Planning

- Massport continued the permitting for redevelopment of the Southwest Service Area (SWSA) at Logan Airport including a new consolidated rental car facility and associated uses. Consolidation of the rental car operations and their shuttle buses into a single coordinated operation will result in reduced vehicle miles traveled and the associated air emissions. A Notice of Project Change was filed for the SWSA Redevelopment Program on October 15, 2009. The primary program change involved elimination of the proposed commercial parking element of the project. This resulted in a downsizing of the structure and its relocation farther from the community. A Final EIR/Environmental Assessment (EA) for the project was filed in March 2010, and on May 28, 2010, the Secretary of EEA issued a Certificate that determined that the EIR/EA adequately and properly complies with MEPA.
- Construction of a 9,300-foot long centerfield taxiway (Taxiway M) was completed and opened in summer of 2009.
- An ENF was filed for the proposed Logan Runway Safety Area (RSA) Improvements at Runway ends 33L and 22R on June 30, 2009, and the Secretary of EEA determined that the preparation of a Draft EIR was required. On July 15, 2010, a Draft EIR/EA for the Logan RSA Improvement Project was filed. The Secretary of EEA is expected to issue a Certificate on the Draft EIR on or about September 24, 2010.

- Preliminary design of a proposed Green Bus Depot for bus maintenance in the North Service Area (NSA) began. An expanded ENF for the Green Bus Depot was filed on July 15, 2010. The Secretary of EEA is expected to issue a Certificate on the ENF on or about September 17, 2010.
- Massport published Sustainable Design Standards and Guidelines (SDSG) for use by architects, engineers, and planners working on capital improvement projects for Massport facilities.
- Planning commenced for two hangar upgrades.
- Terminal B Garage repair and rehabilitation commenced. Solar panels were installed on the roof of the Terminal B garage.
- An extension to Taxiway D was completed.
- Taxiway G realignment construction commenced.
- Planning commenced for the Logan Airport Parking Deck Project on the Robie Parcel within the North Cargo Area (NCA). Construction began in spring 2010.
- Planning for the North Service Area (NSA) Roadway Corridor project began. The NSA Roadway Corridor Project coordinates the roadway and urban design vision for North Service Road and Frankfort Street with on-going design and construction efforts in the NSA. The project will coordinate the NCA Logan Airport Parking Deck Project, East Boston-Chelsea Bypass Project, the SWSA Redevelopment Project, and the NSA Buffer Project to develop a unified utility, roadway, and landscape vision for the NSA roadway corridor between Prescott Street and Neptune Road.
- Planning for the East Boston-Chelsea Bypass Project commenced, to develop a limited access roadway between Logan Airport and the new Chelsea Street Bridge. An ENF is planned for fall of 2010.

Regional Transportation Context

- The total number of air passengers utilizing New England's primary commercial service airports, including Logan Airport, decreased from 44.4 million in 2008 to 42 million in 2009. This represents a passenger traffic decline of 5.4 percent. In the region, activity levels as measured by the number of aircraft operations fell by 14.2 percent, from 1.21 million operations in 2008 to 1.03 million operations in 2009. The decreases in passenger traffic and aircraft operations at New England airports reflect national trends resulting from the worsening global economic recession and the sharp decline in air travel demand.
- Of the 42 million air passengers using New England's primary commercial service airports, 61 percent of air passengers used Logan Airport, a slight increase from 59 percent in 2008.
- Air passenger traffic at the regional airports in New England declined, as the challenging operating environment for airlines affected smaller communities disproportionately. Airlines introduced major reductions in operations throughout the year, eliminating less profitable routes and cutting frequencies in smaller markets. LCCs, such as Southwest Airlines and JetBlue Airways, also stopped expanding their operations at regional airports in recent years, and are now instead focusing on expansion in larger air service markets with a strong business travel portfolio.
- Massport continued negotiations with the City of Worcester to purchase Worcester Regional Airport. In June 2010, the City of Worcester transferred the airport to Massport for $17 million.

Ground Transportation

- Ground transportation activity levels decreased from 2008 to 2009 as a result of a 2.3 percent decline in the annual number of air passengers, as described in *Chapter 2, Activity Levels*.
- Average daily traffic on airport roadways decreased by 7 percent from 2008 to 2009, while VMT (vehicle miles traveled) decreased by 5 percent.
- The number of vehicles parked on-Airport increased by 11 percent in 2009 compared to 2008 as Massport continued to comply with the Logan Airport Parking Freeze.
- Massachusetts Bay Transportation Authority (MBTA) transit ridership to the Airport, including the Blue Line and the Silver Line, increased in 2009.
- Silver Line boardings at the Airport continued to grow, increasing by 11 percent in 2009 (compared to a 5 percent increase in 2008).
- In contrast, air passenger ridership on Logan Express bus, by water transportation, and by limousine decreased in 2009. From 2008 to 2009, Logan Express air passenger ridership decreased by 8 percent, ridership on water transportation decreased by 8 percent, limousine ridership decreased by 11 percent, and taxi dispatches decreased 7 percent.
- Over the past several years, transit services, including Logan Express, have experienced substantial increases in employee use. In 2009, employee use of Logan Express increased 4 percent over 2008 levels.

Noise Abatement

- The decrease in the number of aircraft operations in 2009 resulted in changes in the noise environment. The 2009 Day-Night Sound Level (DNL) contours were smaller in many locations compared to 2008. The 65 dB DNL contour decreased in size in East Boston. The contour reduced in size over Winthrop and towards South Boston from Runway 27, but increased slightly north of the Airport over Revere due to an increase in departures from Runway 4R. The contour also increased south of the Airport over South Boston due to an increase in arrivals to Runways 4L and 4R. These changes are due to extended closings of Runway 9-27 for resurfacing in 2009.
- The overall number of people exposed to DNL values greater than 65 decibels (dB) decreased by 43 percent in 2009 compared to 2008. An estimated 4,335 people were exposed to DNL levels greater than 65 dB, as depicted in the 2009 contour, compared to 7,579 in 2008. This is the first time that the number of people exposed to the 65 dB noise level has been fewer than 5,000. All of the residences exposed to DNL levels greater than 65 dB in 2009 that have chosen to participate in the soundproofing program have been sound-insulated by Massport.
- The total population exposed to noise levels greater than DNL 70 dB decreased from 249 in 2008 to 243 in 2009. There was a reduction of 73 people in Winthrop and an increase of 67 people exposed to greater than DNL 70 dB in Boston, resulting in the slight drop in the total.
- In 2009, Massport provided sound insulation to 83 homes, nearly half of which were in Chelsea. The focus of this program in Chelsea was to fulfill federal and state mitigation commitments related to the opening of Runway 14-32. Since the inception of Massport's sound insulation program, 11,136 homes have been sound-insulated in East Boston, South Boston, Winthrop, Revere, and Chelsea.
- Massport completed installation of an improved Noise Monitoring System (NOMS). The Era Systems Corporation's (ERA) multilateration flight tracking system and all new noise monitors were operational in 2009. Combined with new noise monitor software, the system has an improved capability of correlating

measured noise events with individual flight tracks. This has greatly reduced differences between measured and modeled DNL values.

Air Quality/Emissions Reduction

- The modeled emissions inventory results were driven principally by the lower number of aircraft operations at the Airport compared to 2008, and continual refinements to the FAA Emissions and Dispersion Modeling System (EDMS).
- Total emissions of volatile organic compounds (VOC) were 980 kg/day, or 19 percent lower than 2008 levels.
- Total emissions of oxides of nitrogen (NO_x) were 3,979 kg/day, or 5 percent lower than 2008 levels. In 2009, total NO_x emissions at Logan Airport (net total with reductions) were approximately 746 tons per year (tpy) lower than the 1999 Massport's Air Quality Initiative (AQI) benchmark. This represents a 32 percent decrease in NO_x emissions since 1999.
- Total emissions of carbon monoxide (CO) were 7,925 kg/day, or 5 percent lower than 2008 levels.
- Because of the refinements to the EDMS model and decreased air traffic, total emissions of particulate matter (PM) $PM_{10}/PM_{2.5}$ associated with operations at Logan Airport have decreased by approximately 12 percent to 71 kilograms per day (kg/day) compared to 2008 levels. By comparison, using the earlier EDMS v5.1 total emissions of $PM_{10}/PM_{2.5}$ would have decreased by approximately 2 percent to 79 kg/day. This variation is attributed to differences in the EDMS versions.
- Since 1999 there has been a continuing trend of decreasing nitrogen dioxide (NO_2) concentrations at both the Massport and Massachusetts Department of Environmental Protection (MassDEP) monitoring sites located in the general vicinity of Logan Airport. In addition, the annual NO_2 concentrations at all monitoring locations in 2009 were well within the National Ambient Air Quality Standards (NAAQS) for NO_2.
- The first phase of a two-phase Massport Air Quality Monitoring Study commenced in September 2007, and was completed September 2008, and a final report will be issued summarizing the findings. The study is collecting ambient data on a variety of air pollutants over a two-year period and assess air quality changes attributable to the operation of the new centerfield taxiway. The second phase of the study will begin in September 2010 now that the centerfield taxiway is completed and fully operational.
- The year 2009 marks the third consecutive year in which Massport has voluntarily prepared a GHG emissions inventory for the EDR. The 2009 GHG emission inventory has been updated incorporating guidance developed by the Transportation Research Board's (TRB) Airport Cooperative Research Program (ACRP). The ACRP guidance was published in April 2009 for airport operators developing an airport-specific GHG emissions inventory.[6] While not including emissions from the cruise phase of flight above 3,000 feet, in a change from previous EDRs, the 2009 inventory assigns emissions based on ownership and control boundaries (i.e., emissions and sources associated with Massport, airport tenants and the general public). The vast majority of the emission sources at Logan Airport are owned or controlled by the airlines, other airport tenants, and passenger vehicles. Massport operations contribute only 11 percent of the total GHG emissions for the Airport. Total Logan Airport GHG emissions in 2009 were 14 percent lower than 2008 levels.

6 Transportation Research Board, Airport Cooperative Research Program, ACRP Report 11, Project 02-06, *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories* (in production). See http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf for the full report.

Water Quality/Environmental Compliance and Management

- In 2009, there were six reportable oil and hazardous material spills. Further details on spills can be found in the *Fuel Use and Spills* section of *Chapter 8, Water Quality/Environmental Compliane and Management.*
- Massport received a Notice of Noncompliance (NON) from the MassDEP on September 18, 2009. The NON listed a total of 13 stormwater discharge samples that exceeded permit limits in the period since the National Pollutant Discharge Elimination System (NPDES) permit was issued in July 2007. In response to the NON, Massport implemented corrective actions throughout the Airport directed at specific issues identified in the NON, as well as generally reviewing and updating standard practices at the Airport.
- One outfall sample out of a total of 72 samples at the Maverick Street Outfall exceeded the regulatory limits of the NPDES permit for the North, West and Maverick Street outfalls. This exceedance was reported during March 2009, as required.
- Massport's Storm Water Pollution Prevention Plan (SWPPP) addresses stormwater pollutants in general, and also addresses deicing and anti-icing chemical, potential bacteria, fuel and oil, and other sources of stormwater pollutants. The 2009 Annual Certificates of Compliance were submitted to the U.S. Environmental Protection Agency (EPA) and MassDEP on December 28, 2009, for Massport and each co-permittee.
- In accordance with the requirements of the NPDES permit for Logan Airport, Massport conducted a water quality study to evaluate the potential biological, chemical, and toxicological impacts of deicer discharges on Boston Harbor. The study concluded that deicer discharges do not negatively impact dissolved oxygen levels in the harbor, do not contain materials in concentrations over water quality criteria or toxicological benchmarks, and do not adversely affect the designated uses of the receiving waters.

Sustainability at Logan Airport

Sustainability is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[7] Massport has a commitment to implementing environmentally sustainable practices authority- and airport-wide, and continues to make progress on a range of initiatives.

The following sections describe how sustainability is incorporated into many aspects of Massport's activities: goals and commitments; planning and design; construction; operations, and maintenance. Many of the long-term and multifaceted sustainability initiatives undertaken by Massport are described in individual chapters of this *2009 EDR* where appropriate, and are listed in Table 1-1.

Sustainability Goals

Logan Airport is a complex of interconnected buildings, transportation facilities, utility infrastructure, natural environments, and management systems. The long-range planning, ongoing development, and day-to-day operations present opportunities to adopt sustainable practices that mirror Massport's environmental goals and demonstrate its leadership within New England and the aviation industry. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable design principles.[8]

7 Brundtland_Report, United Nations. "Report of the World Commission on Environment and Development." General Assembly Resolution 42/187, December 11. 1987.
8 The Environmental Management Policy can be viewed on Massport's website at: www.massport.com/environment/Pages/EnvironmentalManagementPolicy.aspx

Massport Goals

In October 2004, Massport prepared the *Massachusetts Port Authority Sustainability Plan* which presents Massport's long-term and short-term sustainability goals. It also identifies the actions necessary to achieve the goals, the staff members responsible for each sustainability goal, and the timeline for achieving the goals. The short-term goals set out in the Sustainability Plan are described below. In 2008, Massport appointed its first full-time Sustainability Program Manager to oversee many of these initiatives. In 2009, Massport undertook the 2010 Environmental Benchmarking Survey sponsored by Airport Council International North America (ACI-NA) to assess solar power, purchase of renewable energy, availability of low emission ground transportation, recycling and "green" purchasing.

Massport-wide Sustainability Goals
▪ *Develop a policy that states that new development projects obtain certification under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™ and include LEED accredited professionals on the design team. LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings.*
▪ *Establish and implement an Alternative Fuel Vehicle Policy (AFV) Policy that requires key personnel to review and consider AFVs when there is a request for a new or replacement vehicle and to select AFVs unless there is a compelling reason not to.*
▪ *Increase construction waste recycling and reuse.*
▪ *Implement a process to consider environmental impacts when making purchases.*

Logan Airport Specific Sustainability Goals
▪ *Establish a recycling program in Airport terminals.*
▪ *Retrofit or purchase heavy-duty equipment with diesel oxidation catalysts or particulate filters.*

State Goals – Leading by Example
The Massachusetts' Governor's *Leading by Example – Clean Energy and Efficient Building Program* (known as the Leading by Example program) was established in 2008 under Executive Order 350. The program's goals cover many specific measures covering a variety of topics, but there are three key areas which guide Massport's sustainability programs: energy intensity, percentage of renewable energy, and GHG reductions. Part of the 2007 Leading by Example Executive Order calls for state agencies to procure 15 percent of their electricity from renewable resources by 2012. The Leading by Example program has influenced Massport's own operations including its offices, heating plants, and garages. Massport received the Leading by Example award in 2008.

International Goals
Massport is a national and international leader in airport environmental programs and policies. Massport was one of 21 U.S. airport authorities to endorse the Aviation Industry Commitment to Action on Climate Change signed in Geneva in 2008.[9] The 2008 Aviation & Environment Summit in Geneva provided the opportunity for the entire industry, as well as regulators and representatives of non-governmental organizations (NGOs), to develop further a vision and strategy, to assess progress, and to agree on future action related to climate change. This was expressed in the signing of the industry-wide declaration. The vision expressed in the declaration is supported by a basic four-pillar strategy based on technological progress, infrastructure enhancements, operational improvements, and suitable economic instruments.

Sustainability in Planning, Design and Construction

Massport reduces its long-term environmental impact by incorporating sustainable techniques during planning, design and construction across the Airport. The following section outlines Massport sustainability achievements.

Sustainable Design Standards and Guidelines
In 2009, Massport developed the SDSG for use by architects, engineers, and planners working on capital improvement projects for Massport. The SDSG applies to both new construction and rehabilitation projects (building and non-building) of any square footage or monetary value. The new standards will apply to over $200 million in capital projects Massport-wide between fiscal years 2010 to 2013, including over $30 million for maritime projects.

9 www.enviro.aero/Aviationindustryenvironmentaldeclaration.aspx

LEED Certified Buildings at Logan Airport	*Terminal A*	*2005/2006*
	Signature Flight Support GA Facility	*2007/2008*
	Future Consolidated Rental Car Facility (ConRAC)	*Future*
ISO 14001 Certified Facilities	*Facilities II*	*2006; 2009*
	Facilities I and III	*Scheduled 2010*

Certified Green Buildings at Logan Airport

During initial planning in 1999, Massport required the new Terminal A, opened in 2005, to incorporate green building practices into its design, construction and operation. In 2006, the U.S. Green Building Council awarded the new Terminal A LEED Certification, becoming the first LEED certified airport terminal in the world. The U.S. Green Building Council's (USGBC) LEED Green Buildings rating system is the most widely recognized third-party green building certification system in North America. Figure 1-3 illustrates the common elements that all LEED certified buildings at Logan Airport share. Terminal A included elements of sustainable design such as alternative transportation options, priority curb locations for high occupancy vehicles including bicycles, storm water filtration, a reflective roof, mechanisms to reduce water use, extensive use of natural daylighting paired with advanced lighting technologies for energy efficiency, use of recycled and regionally sourced materials, and measures to enhance indoor air quality. As a result of these strategies, energy and water use in Terminal A has decreased, and the facility is more welcoming for passengers and healthier for employees.

The new Signature Flight Support GA Facility in the North Cargo Area, which opened in June 2007, incorporates sustainable design, construction, and operational elements. It is the first LEED certified GA facility in the United States. Experience gained at Logan Airport is serving as a model for new Signature Flight Support GA facilities around the U.S., including at Chicago O'Hare International Airport.

One systematic process that is employed globally to work toward environmental sustainability is the International Standards Organization (ISO) 14001 standard. The ISO 14001 standard is an international standard for environmental management systems that is used to minimize harmful effects on the environment caused by building activities, and to achieve continual improvement of a building's environmental performance. ISO 14001 certification for Massport's Logan Airport Facilities II (vehicle maintenance, landscaping, and snow removal) was completed in December 2006 and in was recertified in December 2009. ISO Certification for Facilities I (Central Heating and Cooling Plant) and Facilities III (Electrical and Structural) is scheduled for 2010.

The new Consolidated Rental Car Facility (ConRAC) in the SWSA of the Airport, described further in *Chapter 3, Planning,* began construction in 2010. It will meet the Commonwealth of Massachusetts "LEED Plus" requirements and strive for LEED Silver level certification or better. The ConRAC will include the infrastructure necessary to accommodate future plug-in stations for electric vehicles and other alternative fuel sources such as E-85 (ethanol). The ConRAC could accommodate car sharing services, such as ZipCar®, at a later date. The ConRAC design includes pedestrian and bicycle accommodations including secure bicycle storage. The facility will include efficient water systems including water reclamation for vehicle wash water, and use of stormwater for non-potable uses such as vehicle washing and landscaping irrigation. Energy efficiency is a key component of the Massachusetts LEED Plus system, which requires a building to exceed the current Massachusetts Building Energy Code by at least 20 percent. At least 2.5 percent of the proposed program's overall electricity needs will be met with solar or wind power, or another form of renewable energy. Rental car companies have pledged to maintain rental car fleets which include hybrid or alternative-fuel/low-emitting vehicles.

Figure 1-3 Common Elements of LEED Certified Buildings at Logan Airport

Maximize Daylighting with extensive windows, skylights, and advanced lighting	High Performance Glazing (windows)	Highly Efficient mechanical, electrical and HVAC systems	Use recycled and regionally sourced materials
Deploy alternative fuel Ground Service Equipment	Water efficient landscaping	Recycling of construction and demolition material	Use of low VOC products

Warm Mix Asphalt

In 2008, Logan Airport became the first airport in the U.S. to use warm mix asphalt for its airfield pavement. The outer edges of Runway 4R-22L were milled and repaved using this material in 2008 and all of Runway 9-27, and the new centerfield taxiway were paved using this material in 2009. Warm mix is heated to a lower temperature than hot mix asphalt, which saves energy, resulting in 20 percent lower GHG emissions than hot mix asphalt. On Runway 9-27, this equated to a reduction of nearly 4,000 tons of carbon dioxide, a savings of about 400,000 gallons of diesel fuel, and an energy savings of about 53 billion British Thermal Units (BTUs). Warm mix manufacturing reduces dust and NO_x emissions on site and at the manufacturing plant, and combined with its lower temperature, results in a better working environment for installation crews. Warm mix asphalt contains about 20 percent recycled material, and can be applied in a thicker layer, requiring fewer passes with construction vehicles and fewer emissions of associated pollutants.

Terminal B Garage Renovations

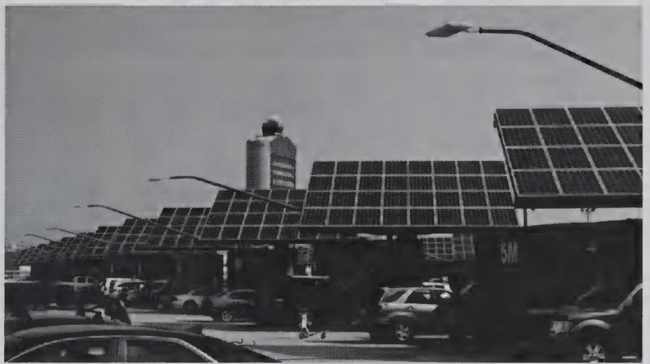
In 2009, Massport began a four-year rehabilitation of the Terminal B parking garage, which includes the installation of solar panels on the top parking deck and high efficiency Light-Emitting-Diode (LED) lighting throughout the structure. The use of motion-detecting LED fixtures will use approximately 50 percent less electricity than the existing lighting, reducing existing usage by 2,261,218 killowatt-hours (kWhs) of electricity per year. This, along with other energy conservation measures, will reduce 1,307 metric tons of carbon dioxide (CO_2) the equivalent of not using 3,040 barrels of oil or 148,385 gallons of gasoline annually. The Airport expects a savings of $3.8 million in electrical usage over the next 20 years based on costs of $0.12 per kWh.

Additionally, the installation of 16 solar panel trees is expected to produce 83,980 kWhs of electricity, or 2.5 percent of the total garage annual consumption. This is equal to the reduction of 50 metric tons of CO_2 the equivalent of not using 115 barrels of oil or 5,637 gallons of gasoline annually. Each solar panel is a single structure design with a stem and steel frame that uses solar panels as a roof over parked cars. The design has the added benefit of collecting rainwater that will be used for landscaping and cleaning projects on the Airport. Each solar array is mounted on an air ventilation unit on the roof of the garage and does not affect parking operations or the number or spaces available to travelers.[10]

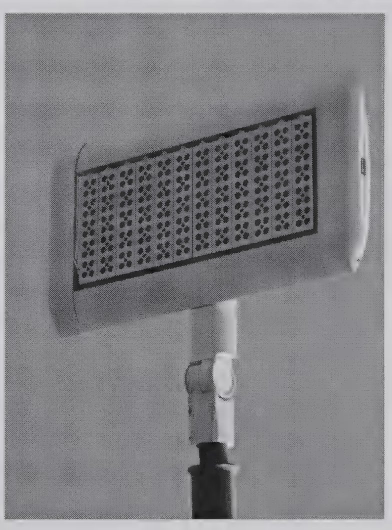
10 Real-time power generation reporting for the solar panels as well as historical numbers and bar charts are available at: http://siteapp.fatspaniel.net/siteapp/detailView.jsf?eid=386776.

Sustainability in Operations and Maintenance

Massport has several programs in place that contribute to the environmentally sustainable operation and maintenance of Logan Airport and its facilities. Massport also encourages its tenants to do the same. Some notable sustainability programs and initiatives include:



Solar panels at on the roof of the Terminal B Garage.



New high efficiency LED lighting at the Terminal B Garage.

Energy
Massport continues to make strides in reducing energy use at the Airport. In 2009, Massport began developing a comprehensive Energy Master Plan for all Massport facilities, which will be completed in 2010. Further details on the Energy Master Plan are included in *Chapter 7, Air Quality/Emissions Reduction*.

Renewable Energy
In March 2008, Massport installed twenty 10-foot-tall wind turbines on the roof of Logan Office Center. The wind turbines are expected to generate approximately 100,000 kWh annually, or about 2.0 percent of the building's monthly energy use. This represents an annual savings of $13,000 a year in energy costs, and a payback period of ten years, and about one ton of carbon annually. As described earlier, the Garage B renovations at Logan Airport include the installation of 16 solar panel trees expected to generate 83,980 kWhs of electricity annually.

Clean Technologies
Massport utilizes advanced technology whenever possible to encourage energy efficiency and reduce GHG emissions:

- Massport is investigating use of an innovative automated system to retrieve hazardous foreign object debris (FOD). This saves time, money and a considerable amount of daily driving on the part of Airport Operations, and provides environmental benefits by reducing emissions of air pollutants associated with vehicle trips to inspect the runways.
- Massport has equipped all aircraft contact gates with 400 Hz power and pre-conditioned air (PCA), which reduces use of on-board gas powered auxiliary power units (APUs) and their associated air emissions.

Alternative Fuel Vehicles
Massport encourages programs and projects that promote the use of electric and alternative fuel vehicles by planning for and constructing the necessary infrastructure to support current and future generations of electric and alternative fuel vehicles. The following projects and programs support alternative fuel vehicles:

- As part of the replacement of Terminal A, Delta Air Lines agreed to introduce battery powered tugs and belt loaders for their ground service fleet at Terminal A. In 2009, Massport approved a $3 million loan to Delta Air Lines to purchase 50 electric baggage cart tugs, 25 electric baggage conveyor belt vehicles, and charging stations for each vehicle. This will reduce emissions and improve the air quality around Logan Airport. Given the financial state of the industry and lack of access to capital markets, Massport agreed to partner with Delta Air Lines to support this important environmental commitment. Delta Air Lines will be the first airline at Logan Airport to have a full fleet of alternative fueled ground service equipment (GSE).

Terminal A, with Delta GSE vehicles in the foreground.

- When constructed, the new ConRAC in the SWSA will include charging stations which conform to the new North American fast-charging standard SAE J1772-2009 electrical connector. All new mass-produced electric vehicles available starting in 2010 will use this connection configuration. In 2009, Massport applied for FAA's Voluntary Airport Low Emissions Program (VALE) grant to fund 75 percent of the incremental cost for the purchase of a new hybrid bus fleet for the ConRAC facility.
- The 2008 renovations to the existing public gas station in the NCA included installing an E85 fuel dispensing tank. E85 is a first-generation biofuel which helps reduce dependence on foreign sources of oil. One of the largest public compressed natural gas (CNG) stations in New England is at Logan Airport. CNG burns cleaner than other vehicle fuels, producing significantly lower amounts of harmful emissions.[11]
- Massport's "CleanAir Cab" incentive program for alternative fuel vehicles (AFVs) or hybrid taxis, started in 2007 in cooperation with the City of Boston, continues to be successful. These taxis are given head of the line privileges in the taxi queue and passengers can request an AFV or hybrid taxi from the taxi queue. As a result of a large increase in the number of hybrid taxis in Boston's taxi fleet since 2007, two hybrid taxis are now given priority as part of each 10-car dispatch group from the taxi queue.
- Massport has supported and sponsored the Boston GreenFest since 2009 and AltWheels Fleet Day since 2003. These are annual forums to promote alternative fuels and sustainable transportation modes. Massport has been a financial sponsor of these events. Massport AFVs are exhibited on Fleet Day alongside an exhibit booth, and Massport's CNG buses transport attendees between event sites.

A sign reminding customers that a CleanAir Cab is available upon request.

11 For more information on the cleaner burning performance of CNG vehicles visit the EPA's website: http://www.afdc.energy.gov/afdc/vehicles/natural_gas_emissions.html

Waste, Recycling and Materials

Massport continues to expand its waste reduction and recycling programs and policies and fully supports tenants and airlines to achieve these same goals:

- Massport's environmentally preferred procurement policy requires purchase of environmentally preferrable versions of most products purchased by Massport, it covers items such as from recycled paper for Massport offices, to environmentally friendly cleaning supplies.
- Massport contracts with a cleaning contractor which uses products which are environmentally friendly, such as natural or biodegradable soaps and detergents instead of harsh chemicals, for Massport operated facilities.
- Massport's construction contracts include a requirement for contractors to recycle construction and demolition debris and other materials.
- Massport implemented a terminal area recycling program at Logan Airport constisting of all interior public areas of all of the terminals, both post-security and pre-security. This includes collection of mixed paper (newspaper, cardboard and magazines), plastics, aluminum, and glass. Logan Airport recycling program also covers Massport's administrative building, the Logan Office Center.
- Logan Airport uses single-stream recycling dumpsters: paper cardboard, plastic, aluminum, and glass are deposited all in one container. This encourages recycling by simplifying collection.
- Some concessionaires have their own corporate waste reduction and recycling programs supported by their own brand, and use biodegradable plastic bags, utensils, and takeout containers.
- Since 2005, Massport has been a member of the EPA's WasteWise Program, a national voluntary solid waste reduction program. Massport gains access to the best practices of over 1,000 members and strives to establish new waste prevention activities, expand or improve current recycling efforts, and purchase additional products with recycled content.
- Massport provides all airlines with the facilities necessary to support in-flight recycling, but participation is determined by each individual airline, sometimes on a flight-by-flight basis. Delta Air Lines now recycles paper, plastic, and aluminum from all of its flights that land at Logan Airport. Due to U.S. Department of Agriculture (USDA) and U.S. Customs and Border Protection (USCBP) regulations, waste from international flights is considered regulated waste and must be separated and incinerated or sterilized at a special facility.

Internal Education and Training

Massport has a program that educates Massport staff on everyday ways to save energy and reduce waste while at work. Informational signs and flyers for staff contain details on the types of materials that can be recycled at work and strategies for saving energy on a daily basis by, for example, turning off lights when leaving a conference room or office, and turning computers off at night.

Additional Sustainability Programs and Initiatives

The following sustainability programs and initiatives found in Table 1-1 are further described in individual chapters of this *2009 EDR*. They are highlighted in each chapter with a sustainability leaf.

Table 1-1 Additional Sustainability Projects and Initiatives Documented in the EDR

Sustainability Program or Initiative	Description	Reference in *2009 EDR*
Green Bus Depot	LEED certified bus maintenance facility on-airport to service Massport's new fleet of clean-fuel shuttle buses.	Chapter 3- Planning
GreenDOT and Massachusetts Healthy Transportation Compact	Statewide transportation initiatives that balance the needs of all transportation users, improve public health, and reduce the environmental impact of transportation.	Chapter 4 – Regional Transportation
Cell Phone Waiting Lot	Temporary parking for vehicles waiting to pick up passengers from an arriving flight; reduces auto circulation.	Chapter 5—Ground Transportation
Logan Transportation Management Association (Logan TMA)	The Logan TMA helps to reduce the number of Airport employees commuting by private automobile, to enhance commuter options, and to reduce traffic and parking demands at Logan Airport.	Chapter 5—Ground Transportation
Preferred Parking for Alternative Fuel Vehicles	Massport created preferred parking areas in garages, close to terminal entry points for alternative fuel or hybrid vehicles.	Chapter 5—Ground Transportation
Logan Airport Silver Line and Blue Line Rapid Transit Service	Massport supports MBTA rapid transit service which serves all terminals at Logan Airport from South Station and Airport Station.	Chapter 5—Ground Transportation
High occupancy vehicle (HOV) goals	The goal of Massport is to attain a 35.2 percent HOV ground-access mode share at the 37.5 million air passenger annual level.	Chapter 5—Ground Transportation
Logan Air Quality Initiative (AQI)	The AQI is a 15-year voluntary program with the goal of maintaining NOx emissions at, or below, 1999 levels.	Chapter 7—Air Quality
Massport Alternative Fuel Vehicle Purchasing Policy	This is a policy to replace conventionally-fueled fleet with alternatively fueled or powered vehicles, when feasible.	Chapter 7 – Air Quality
CNG Shuttle Buses	CNG is considered a cleaner burning fuel than many others, Massport buses have logged over 14 million CNG miles.	Chapter 7—Air Quality
Cogeneration Study	2008 Cogeneration Study assessing feasibility of developing a cogeneration plant at Logan Airport	Chapter 7—Air Quality
Clean State Initiative and Leading by Example Program	The Governor's Leading by Example program works with agencies to improve energy efficiency and increase renewable energy use in state buildings and fleets.	Chapter 8 – Water Quality

Note: This is a list of key sustainability achievements included in later chapters of this *2009 EDR*, and it is not a complete list of all achievements.

Sustainability Awards

Table 1-2 highlights some of the most recent environmental sustainability-related awards Massport has received. Massport is continually recognized as an environmental leader by national and international organizations in various industries.

Table 1-2 Sustainability Awards

Year	Awarding Organization	Name of Award	Subject
2008	American Institute of Aeronautics and Astronautics (AIAA), the American Association of Airport Executives (AAAE), and the Airports Consultants Council (ACC)	Jay Hollingsworth Speas Airport Award	The award recognizes the environmental benefits achieved by Terminal A at Boston Logan International Airport, the world's first LEED certified airport terminal.
2008	Commonwealth of Massachusetts	Leading by Example Awards	The Leading by Example Awards recognize outstanding efforts among Commonwealth agencies, public colleges and universities, and municipalities which have established and implemented policies and programs resulting in significant and demonstrable environmental benefits.
2008	Airports Council International –North America (ACI-NA)	Environmental Management Award	Logan Airport's Air Quality Program / Emissions Reduction Program
2007	Business travel website Aviation.com.	"Easiest Airport to Get To"	Logan Airport is among the closest airports in the country to the Central Business District of a major city (across the harbor), with a five minute drive or 15 minute rapid transit ride to downtown Boston, reducing emissions associated with accessing the airport, when compared to peer airports.

Organization of the *2009 EDR*

The remainder of this *2009 EDR* is organized as follows:

- ***Chapter 2, Activity Levels***, presents aviation activity statistics for Logan Airport in 2009 and compares activity levels to the prior year. The specific activity measures discussed include air passengers, aircraft operations, fleet mix, and cargo/mail volumes.
- ***Chapter 3, Airport Planning***, provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2009. It also describes known future planning, construction, and permitting activities and initiatives.
- ***Chapter 4, Regional Transportation Context***, describes activity levels at New England's regional airports in 2009 and updates recent regional planning activities.
- ***Chapter 5, Ground Transportation***, reports on transit ridership, roadways, traffic volumes, and parking for 2009.
- ***Chapter 6, Noise Abatement***, updates the status of the noise environment at Logan Airport in *2009*, and describes Massport's efforts to reduce noise levels.

- ***Chapter 7, Air Quality/Emissions Reduction***, provides an overview of airport-related air quality issues in 2009 and efforts to reduce emissions.
- ***Chapter 8, Water Quality/Environmental Compliance and Management***, describes Massport's ongoing environmental management activities including NPDES compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan (MCP), and tank management.
- ***Chapter 9, Project Mitigation Tracking***, reports on Massport's progress in meeting its MEPA Section 61[12] mitigation commitments for specific Airport projects.

Supporting appendices include the following:

- **MEPA Appendices**: The Secretary of EEA's Certificate on the *2008 EDR*, comment letters received on the *2008 EDR* and responses to those comments, Secretary of EEA's Certificates on the annual reports issued for reporting years 2004 through 2008, a list of reviewers to whom the *2009 EDR* was distributed, and a proposed scope for the *2010 EDR*.
- **Technical Appendices**: These include detailed analytical data and methodological documentation for the various environmental analyses presented in and conducted for this *2009 EDR*.

12 Massachusetts General Law, Chapter 30, Section 61 (M.G.L. c. 30, § 61).

2

Activity Levels

Introduction

This chapter reports on annual activity for Logan Airport in 2009, including air passengers, aircraft operations, aircraft fleet mix, and cargo and mail volumes. The 2009 activity levels are compared to 2008 levels. A trends analysis is conducted in the Logan Airport Environmental Status and Planning Reports (ESPRs); the next ESPR will report on 2011 conditions, review historic trends and present an updated long-term forecast of aviation activity levels at Logan Airport through 2030.

The activity levels form the basis for the evaluation of ground transportation, noise, and air quality impacts associated with Logan Airport activities.

Key Findings

In 2009, the continuing global economic recession led to further declines in passenger levels at airports across the country. While fuel costs fell after reaching historic highs in July 2008, reduced passenger demand, cost pressures from low-cost carrier (LCC) competition, and declining revenues resulted in an extremely challenging operating environment for airlines. Many U.S. carriers continued to curtail capacity in 2009. The airline industry also consolidated as Delta Air Lines and Northwest Airlines integrated their flying operations after Delta Air Lines acquired Northwest Airlines in October 2008. These national trends also impacted Logan Airport, which saw a decrease in passengers and aircraft operations in 2009.

Significant changes in activity at Logan Airport in 2009 include the following:

- The total number of air passengers at Logan Airport during 2009 dropped to 25.5 million, compared to 26.1 million in 2008. The decrease in the total number of air passengers was 2.3 percent, compared to a decrease of 7.1 percent in the previous year. The 2009 decrease was less severe than the drop in the overall U.S. trend for air passengers, which fell by 5.3 percent in 2009. The decreases in passenger traffic and aircraft operations reflect national trends resulting from the worsening global economic recession and the sharp decline in air travel demand.
- The total number of aircraft operations declined from 371,604 in 2008 to 345,306 in 2009, a decrease of 7.1 percent. Passenger aircraft operations decreased by 3.8 percent. Operations by general aviation (GA) aircraft declined by a dramatic 48.6 percent in 2009. The steep decline GA activity reflects the economic

downturn and changes in corporate travel policies, which limit the use of private GA transportation by executives. Cargo operations decreased by 23.2 percent in 2009, compared to 2008.

- The number of air passengers per aircraft operation increased, from an average of 70.2 passengers per aircraft operation in 2008 to an average of 73.9 passengers per aircraft operation in 2009. The passenger load factor (percentage of seats occupied by revenue passengers) also increased slightly from 72.8 to 72.9. This reflects greater air carrier efficiency.
- While legacy airlines, such as Delta Air Lines, Continental Airlines, and US Airways, reduced aircraft operations significantly at Logan Airport, LCCs operations increased by 12.3 percent. In addition to a continuing expansion in service offerings by JetBlue Airways, Logan Airport saw operations for two new LCCs, Southwest Airlines and Virgin America, begin in 2009.
- Air cargo volumes declined 12.1 percent from 621 million pounds in 2008 to 546 million pounds in 2009. The largest volume decrease occurred in the express/small packages segment.

Air Passenger Trends

Passenger levels at Logan Airport totaled 25.5 million in 2009, compared to 26.1 million in 2008, representing a 2.3 percent decline, compared to an even sharper decline of 7.1 percent between 2007 and 2008. Between 2008 and 2009, the 2.3 percent passenger decline at Logan Airport was less severe than the drop in the overall U.S. market, which fell by 5.3 percent in 2009, largely because of the continued expansion of LCCs at Logan Airport.[1] Domestic air passengers, Logan Airport's largest market segment at 85.3 percent of total passengers, decreased by 1.2 percent (Table 2-1). Factors affecting passenger levels at Logan Airport included:

- The worsening global economic recession, which resulted in rising unemployment, decreasing economic activity, a tightening of corporate travel policies, and a drop in disposable income nationally.
- Airline capacity cuts by Logan Airport's largest legacy carriers (including their regional affiliates) — American Airlines, Delta Air Lines, United Airlines, and US Airways.

Table 2-1 Air Passengers by Market Segment[1]

	2004	2005	2006	2007	2008	2009	Percent Change (2008-2009)
Domestic	**21,830,294**	**22,728,788**	**23,556,382**	**23,837,727**	**22,032,246**	**21,767,086**	**(1.20%)**
International	**4,201,638**	**4,237,105**	**4,049,595**	**4,153,442**	**3,977,297**	**3,696,336**	**(7.06%)**
Europe/ Middle East	2,590,225	2,629,823	2,599,382	2,754,427	2,687,693	2,605,825	(3.05%)
Canada	622,098	682,904	621,185	581,178	552,745	453,430	(17.97%)
Bermuda/ Caribbean	911,757	845,863	784,477	807,094	731,946	636,719	(13.01%)
Asia/Pacific[2]	0	0	0	0	392	0	(100.00%)
Central/South America	77,558	78,515	44,551	10,743	4,521	362	(91.99%)
General Aviation	**110,584**	**122,012**	**119,466**	**111,286**	**93,108**	**48,664**	**(47.73%)**
Total Passengers	**26,142,516**	**27,087,905**	**27,725,443**	**28,102,455**	**26,102,651**	**25,512,086**	**(2.26%)**

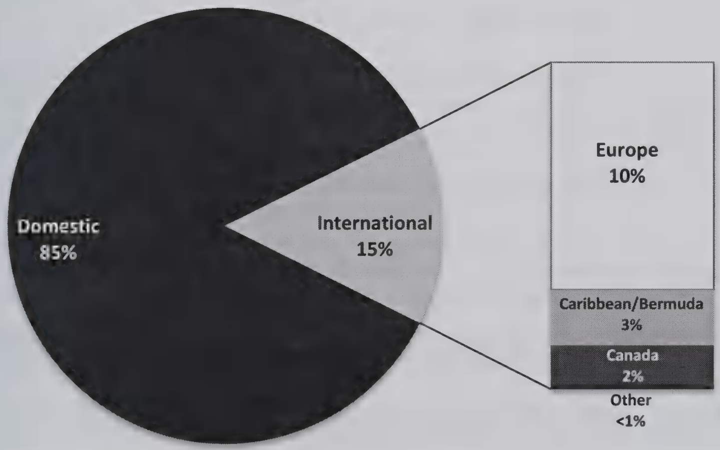
Source: Massport.
1 Direct flights only.
2 Scheduled direct flights to the Asia/Pacific region ended in 2001. Asia/Pacific passengers in 2008 included non-scheduled flights.

1 Bureau of Transportation Statistics.

While the rate of decline in the number of Logan Airport's domestic passengers lessened in 2009, the rate of decline in international passengers accelerated as the recession took hold globally and foreign airlines responded to weak demand by sharply reducing scheduled services. International passenger traffic at Logan Airport decreased by 7.1 percent in 2009, compared to a 4.2 percent decrease in 2008.

Figure 2-1 shows the distribution of Logan Airport passengers by market segment. Europe was the dominant international destination market, accounting for 70.5 percent of international traffic and 10.2 percent of total traffic at Logan Airport. Air traffic to Europe was down 3.0 percent from 2008 levels, compared to a decline of 2.4 percent between 2007 and 2008. The Bermuda/Caribbean market, Logan Airport's second largest region for international passengers, dropped by 13 percent. Travel to and from Canada also continued to decline, falling by 18 percent in 2009.

Figure 2-1 Distribution of Logan Airport Passengers by Market Segment (2009)



Source: Massport. Figures rounded.
Note: Other includes General Aviation (GA) operations.

Cutbacks in scheduled service to international destinations, particularly destinations in Canada and Europe, contributed to international passenger decline at Logan Airport in 2009. Scheduled weekly departures to Canada were down 6.7 percent from the previous year, while scheduled weekly departures to Europe were down 3.1 percent. Overall, total scheduled international departures dropped by 1.9 percent in 2009, with capacity reductions continuing throughout the year.

Aircraft Operations in 2009

The total number of aircraft operations at Logan Airport (including passenger service, general aviation and all-cargo) declined from 371,604 operations in 2008 to 345,306 operations in 2009, a decrease of 7.1 percent (Table 2-2). Aircraft operations declined at a faster rate than passenger levels, as airlines cut back on service frequencies in advance of declining passenger demand through the economic downturn and reduced flying to small and medium size markets to control costs.

Passenger Operations

Passenger aircraft operations, which represent 95 percent of total aircraft operations at Logan Airport, declined by 3.8 percent in 2009. Regional jet (RJ) operations showed the sharpest decline. RJ operations decreased by 12.9 percent while passenger operations in jet aircraft (with 90 or more seats) only declined by 2.2 percent in 2009. The decrease in RJ operations at Logan Airport was a result of airlines adjusting their capacity downward to suit demand. Delta Air Lines eliminated RJ flights to nine small and medium size markets in the Southeast and reduced its RJ flying in several high-density markets, i.e., New York JFK, Philadelphia, and Baltimore. US Airways also made significant cutbacks in RJ services to markets in the Northeast.

When RJs were introduced into the U.S. airline fleet in large numbers, they typically had a capacity of 35 to 50 seats and had longer operating ranges than similarly sized turboprops. However, newer larger regional jets are blurring the distinction between "jets" and "regional jets." For example, the Embraer-190, operated by JetBlue Airways and US Airways at Logan Airport, carries up to 100 passengers and models capable of carrying more than 100 passengers are under development. In this *2009 EDR*, the term "regional jet" refers to small jet aircraft with up to 80 seats. Airlines have been retiring the smaller RJs (50 seats and under), which have proven to not be cost effective in the current operating environment, and increasing use of larger RJs and turboprops (with 70 to 80 seats). This trend is also evident at Logan Airport. From 2006 through 2009, the use of larger RJs with 70 to 80 seats at Logan Airport has increased steadily to a 23 percent share of total RJ operations.

Passenger operations by non-jet aircraft (turboprop or piston aircraft) increased by 4.7 percent. The increase in non-jet passenger operations was driven by an increase in operations by Cape Air, which operated 8.5 percent more operations at Logan Airport in 2009 compared to the prior year. The change in the aircraft mix of scheduled passenger flights at Logan Airport over the last four years is shown in Figure 2-2.

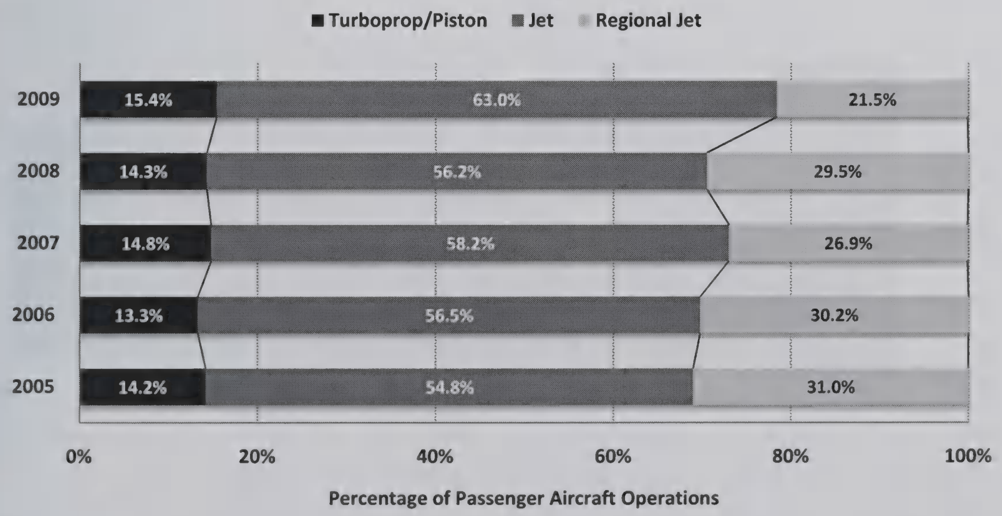
There was an average of 105 seats per scheduled passenger flight from Logan Airport in 2009, up from 103 in 2008 and a low of 87 in 1993. Since 2002, the average number of seats per flight at Logan Airport has been higher than the national average. In 2009, the national average aircraft size was 97 seats, compared to 105 at Logan Airport. The average size of an RJ departing Logan Airport was 53 seats in 2009, up from 52 in 2008. As described earlier, this increase reflects a move by carriers—Delta Air Lines, in particular—to shed smaller 50-seat RJs in favor of more fuel-efficient 70 to 80-seat RJs. Midwest Airlines also added 70-seat Embraer-170 regional service at Logan Airport in 2009.

Table 2-2 Logan Airport Aircraft Operations

Category	2004	2005	2006	2007	2008	2009	Percent of Total (2009)	Percent Change (2008-2009)
Total Aircraft Operations	**405,259**	**409,067**	**406,119**	**399,537**	**371,604**	**345,306**	**100.0%**	**(7.08%)**
Operations by Type and Aircraft Class								
Passenger Jet	245,397	201,502	206,467	220,135	209,931	205,341	59.5%	(2.18%)
Passenger Regional Jet	102,039	113,886	110,554	88,500	80,589	70,198	20.3%	(12.89%)
Passenger Non-Jet	57,823	52,114	48,663	53,663	48,595	50,867	14.7%	4.67%
Total Passenger Operations	**364,434**	**367,502**	**365,684**	**362,298**	**339,115**	**326,410**	**94.5%**	**(3.75%)**
GA Jet Operations	23,085	25,806	26,566	22,925	17,750	8,988	2.6%	(49.37%)
GA Non-Jet Operations	8,151	6,846	4,878	5,707	6,070	3,254	0.9%	(46.38%)
Total GA Operations	**31,236**	**32,652**	**31,444**	**28,632**	**23,820**	**12,242**	**3.5%**	**(48.61%)**
Cargo Jet	9,589	8,913	8,493	8,084	8,149	5,431	1.6%	(33.36%)
Cargo Non-Jet	0	0	498	523	520	1,227	0.4%	136.05%
Total Cargo Operations	**9,589**	**8,913**	**8,991**	**8,607**	**8,669**	**6,658**	**1.9%**	**(23.20%)**

Source: Massport.
Note: Jet includes the Embraer-190, which is a regional jet configured with 88-100 seats, but is similar in size to some traditional narrow body jets. Jet and regional jet numbers for 2007 and 2008 have been restated to count EMB-190s as Jets.

Figure 2-2 Mix of Scheduled Passenger Aircraft Operations at Logan Airport by Aircraft Class



Source: Massport, OAG
Note: Numbers may not add to 100 percent due to rounding.

US Airways, American Airlines, Delta Air Lines, JetBlue Airways, and Cape Air were the largest carriers at Logan Airport in 2009 based on aircraft operations.[2] US Airways and its affiliates accounted for approximately 60,000 operations, maintaining its position as the largest carrier at Logan Airport. American Airlines moved up to a number two ranking with 47,400 operations. Delta Air Lines ranked third with 47,100 operations following significant cutbacks throughout the year as it absorbed the former Northwest Airlines into its air service network. JetBlue Airways, with 40,400 operations at Logan Airport in 2009, and Cape Air, with 36,700 operations, ranked 4th and 5th, respectively. Figure 2-4 shows the top four airlines at Logan Airport according to passenger levels.

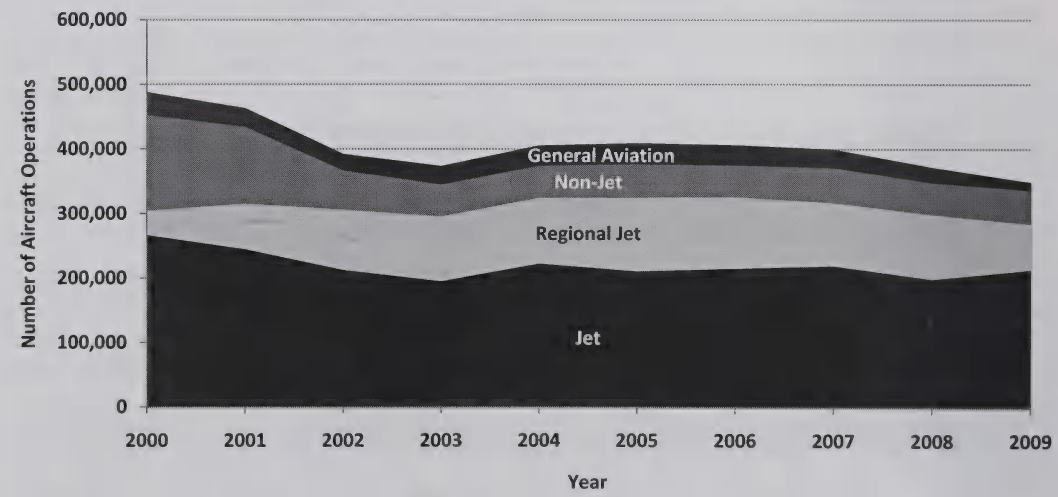
General Aviation Operations

GA aircraft operations, which accounted for 3.5 percent of Logan Airport's aircraft activity in 2009, decreased by 48.6 percent. The steep decline GA activity reflects the economic downturn and changes in corporate travel policies, which limit the use of private GA transportation by executives.

Cargo Operations

All-cargo aircraft operations, which are also strongly linked to the economy, dropped 23.2 percent in 2009 from 2008 levels. The all-cargo segment represents less than 2.0 percent of total aircraft operations at Logan Airport. Figure 2-3 depicts the changes in Logan Airport aircraft operations by category since 2000.

Figure 2-3 Aircraft Operations at Logan Airport by Aircraft Class



Source: Massport.
Notes: Jet, regional jet, and non-jet operations are associated with commercial passenger and all-cargo airlines. General aviation operations also include jet and non-jet aircraft, but are associated with private, corporate, and on-demand charters.

2 Airline rank is based on total number of operations for carrier "families," including activity for all code share partners and regional subsidiaries.

Passengers and Operations Trends in 2009

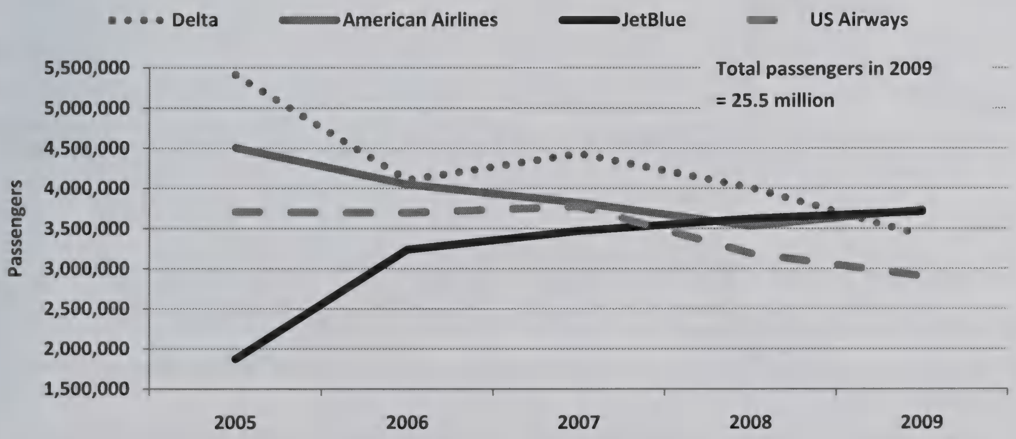
The total number of passengers at Logan Airport declined from 26.1 million passengers in 2008 to 25.5 million passengers in 2009. Figure 2-4 shows the total number of passengers carried by the top four largest airlines. The average number of passengers per aircraft operation increased in 2009, continuing the trend seen over the past five years. In 2009, Logan Airport operations accommodated an average of 73.9 passengers per flight compared to 70.2 passengers in 2008 (Table 2-3). The average number of passengers per flight has risen by 12.7 percent since 2004. This is a reflection of the airlines' continued emphasis on capacity rationalization and increasing passenger load factors (the percentage of seats occupied by revenue passengers). The load factor for flights from Logan Airport has historically tracked below the national average. In 2009, the average domestic load factor for flights at Logan Airport increased to 72.9 percent, up slightly from 72.8 percent in 2008. The national average also increased to 76.1 percent in 2009, compared to 75.1 percent in 2008.

Table 2-3 Air Passengers and Aircraft Operations

Year	Air Passengers	Percent Change	Aircraft Operations	Average Passengers per Operation	Load Factor	Net Change From Previous Year
2004	26,142,516	14.70%	405,258	64.5	–	3.4
2005	27,087,905	3.62%	409,066	66.2	70.8	1.7
2006	27,725,443	2.35%	406,119	68.3	72.4	2.1
2007	28,102,455	1.36%	399,537	70.3	74.9	2.1
2008	26,102,651	(7.12%)	371,604	70.2	72.8	-0.1
2009	25,512,086	(2.26%)	345,306	73.9	72.9	3.6

Source: Massport.

Figure 2-4 Annual Passengers at Logan Airport Among Top Four Airlines



Source: Massport.
Note: For comparison purposes, Delta Air Lines figures in this chart include Northwest Airlines, which merged into Delta Air Lines in 2009, and US Airways figures include America West Airlines which merged with US Airways in 2005. Figures for American Airlines include the wholly-owned subsidiary, American Eagle. Figures for Delta, American Airlines, and US Airways do *not* include any contract carriers doing business as Delta Connection, US Airways Express, or American Connection.

Airline Passenger Service in 2009

In 2009, approximately 60 airlines provided scheduled or charter passenger service from Logan Airport to more than 100 non-stop destinations. This section describes the major changes in Logan Airport's scheduled passenger services in 2008.

Changes in Domestic Passenger Service

As shown in Table 2-4, total domestic flights at Logan Airport declined by 3.6 percent in 2009. Scheduled domestic jet carrier flights dropped by 2.9 percent from 2009, while regional/commuter flights fell even more steeply by 4.7 percent.

Operations by LCCs at Logan Airport increased by 12.3 percent in 2009. JetBlue Airways, the largest LCC at Logan Airport, continued its expansion in service, increasing its domestic operations by 3.4 percent from 34,900 operations in 2008 to 38,100 operations in 2009. New LCC entrants Southwest Airlines and Virgin America accounted for 2,600 operations and 3,400 operations respectively in 2009. The average non-stop stage length (the average length of non-stop flights) of scheduled domestic flights from Logan Airport increased in 2009 to 748 miles from 733 miles in 2008.

Table 2-4 Domestic Air Passenger Operations by Airline Category

Category	2004	2005	2006	2007	2008	2009	Net Change (2008-2009)	Percent Change (2008-2009)
Total Jet Operations	**193,599**	**190,991**	**199,281**	**198,879**	**189,739**	**184,181**	**-5,558**	**(2.93%)**
Legacy/Charter Carriers	146,411	137,422	141,704	143,465	136,285	124,147	-12,138	(8.91%)
Low-Cost Carriers	47,188	53,569	57,577	55,414	53,454	60,034	6,580	12.31%
Regional/Commuter	**130,272**	**137,203**	**130,298**	**124,014**	**112,881**	**107,615**	**-5,266**	**(4.67%)**
Charter Carriers	**423**	**325**	**369**	**570**	**582**	**412**	**-170**	**(29.21%)**
Total Domestic	**324,294**	**328,519**	**329,948**	**323,463**	**303,202**	**292,208**	**-10,994**	**(3.63%)**

Source: Massport.
Note: Low-cost carriers (LCCs) serving Logan in 2009 included AirTran Airways, JetBlue Airways, Southwest Airlines, Spirit Airlines, and Virgin America. America West, which was merged with US Airways in September 2005, is not included as a LCC in 2006-2008 because the combined entity had operating costs significantly higher than those of the LCCs.

Changes in Domestic Markets Served

New non-stop service from Logan Airport was introduced in a number of domestic markets in 2009:

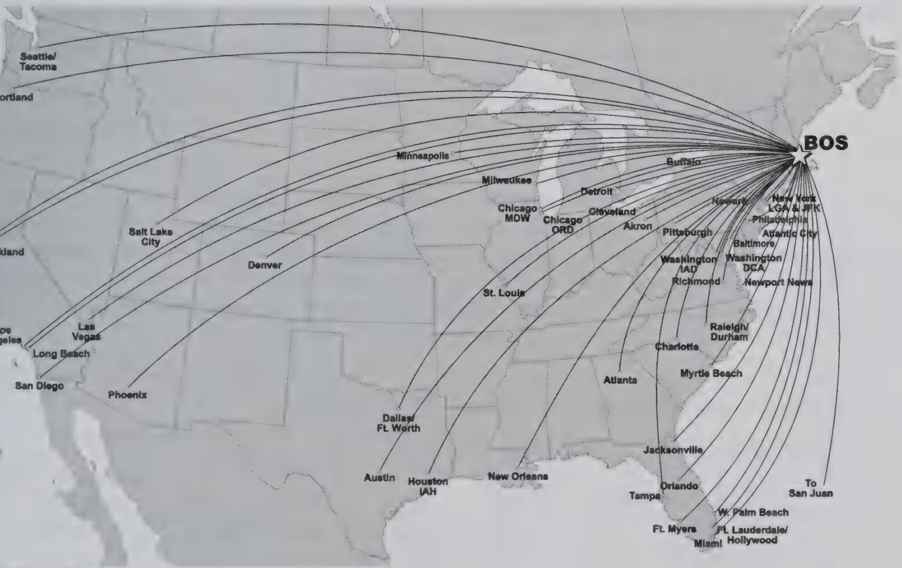
- JetBlue Airways launched four times daily non-stop Embraer-190 service to Baltimore.
- New entrant Southwest Airlines introduced five times daily non-stop service to both Baltimore and Chicago Midway.
- New entrant Virgin America introduced three times daily non-stop service to Los Angeles and San Francisco.
- Spirit Airlines launched daily non-stop Atlantic City service.
- Sun Country began seasonal service to Minneapolis.

The major domestic service reductions at Logan Airport that led to a drop in passenger levels in 2009 compared to the previous year included the following:

- Delta Air Lines continued substantial cutbacks in scheduled service at Logan Airport in 2009. In addition to over 20 routes discontinued in 2008, Delta further cut services to three markets: Baltimore, Fort Lauderdale, and Philadelphia. Significant reductions in seat capacity also occurred in a number of other markets including Cincinnati and Detroit.
- US Airways discontinued flights to Indianapolis, Islip, Rockland (ME), and Westchester.
- Other legacy carriers American Airlines, Continental Airlines, and United Airlines also reduced capacity at Logan Airport. The three carriers cut overall domestic seat capacity at Logan Airport by 1.8 percent, 7.1 percent, and 3.1 percent respectively.
- AirTran discontinued services to Tampa and West Palm Beach, which were introduced in late 2007.

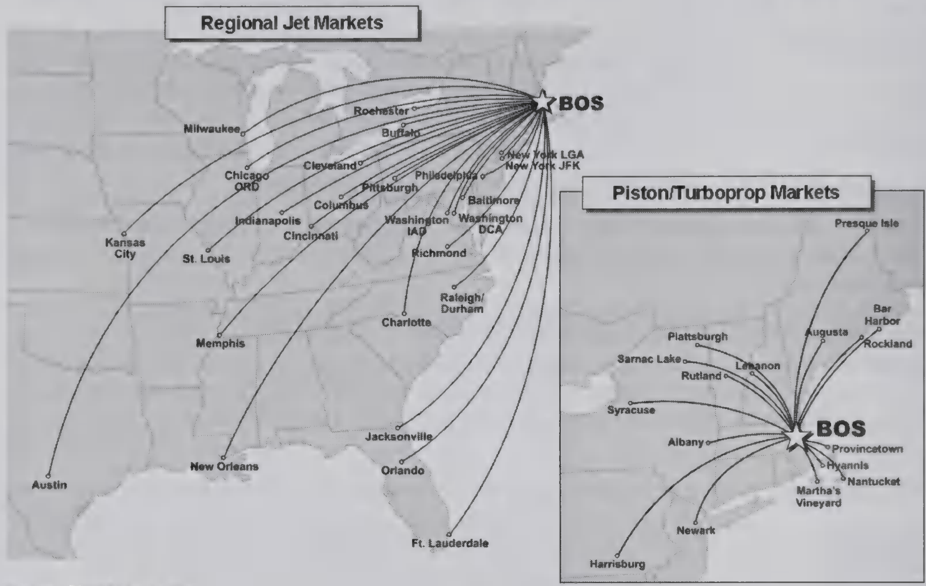
A complete listing of all changes in scheduled departures by domestic destination is in *Appendix E, Activity Levels*. Logan Airport's current domestic large jet and domestic regional service is illustrated in Figure 2-5 and Figure 2-6.

Figure 2-5 Domestic Non-stop Large Jet Markets Served from Logan Airport (August 2009)



Source: OAG Market Files.

Figure 2-6 Domestic Non-stop Regional Markets Served from Logan Airport (August 2009)



Source: OAG Market Files.

Changes in International Passenger Service

Total international passenger operations fell 4.8 percent in 2009, as summarized in Table 2-5. (For details on the changes in operations by carrier, see *Appendix E, Activity Levels*). All segments for scheduled international operations experienced declines in 2009. The Canadian market, Logan Airport's largest international destination region in terms of aircraft operations, shrank by 7.4 percent. The Europe/Middle East market, the second largest international market in terms of operations and the largest in passengers, experienced a 3.0 percent decrease in aircraft operations. The Bermuda/Caribbean market shrank by 1.2 percent in 2009.

Table 2-5 International Passenger Operations by Market Segment

Category	2004	2005	2006	2007	2008	2009	Percent Change (2008-2009)	Average Annual Growth (2005-2009)
Scheduled	**38,588**	**37,575**	**35,003**	**38,308**	**35,538**	**33,878**	**(4.67%)**	**(2.56%)**
Europe/Middle East	12,085	12,206	11,954	13,127	13,366	12,960	(3.04%)	1.51%
Canada	18,639	18,914	16,893	18,859	15,996	14,815	(7.38%)	(5.92%)
Bermuda/Caribbean[1]	6,838	5,594	5,710	6,191	6,176	6,103	(1.18%)	2.20%
Central/South America	1,026	861	446	131	0	0	–	(100.00%)
Non-Scheduled	**1,467**	**1,068**	**727**	**527**	**375**	**320**	**(14.67%)**	**(26.01%)**
Total	**40,055**	**38,643**	**35,730**	**38,835**	**35,913**	**34,198**	**(4.78%)**	**(3.01%)**

Changes in International Markets Served during 2009

New non-stop service from Logan Airport was introduced in a few international markets in 2009:

- JetBlue initiated service to two Caribbean markets, Saint Maarten and Santo Domingo.
- New entrant Porter Airlines launched Q400 turboprop service to Toronto Island Airport in September 2009.
- US Airways launched two to five times weekly non-stop service to Providenciales (Turks and Caicos Islands) in the Caribbean.

A number of service reductions led to the largest decline in aircraft operations in the Canada markets:

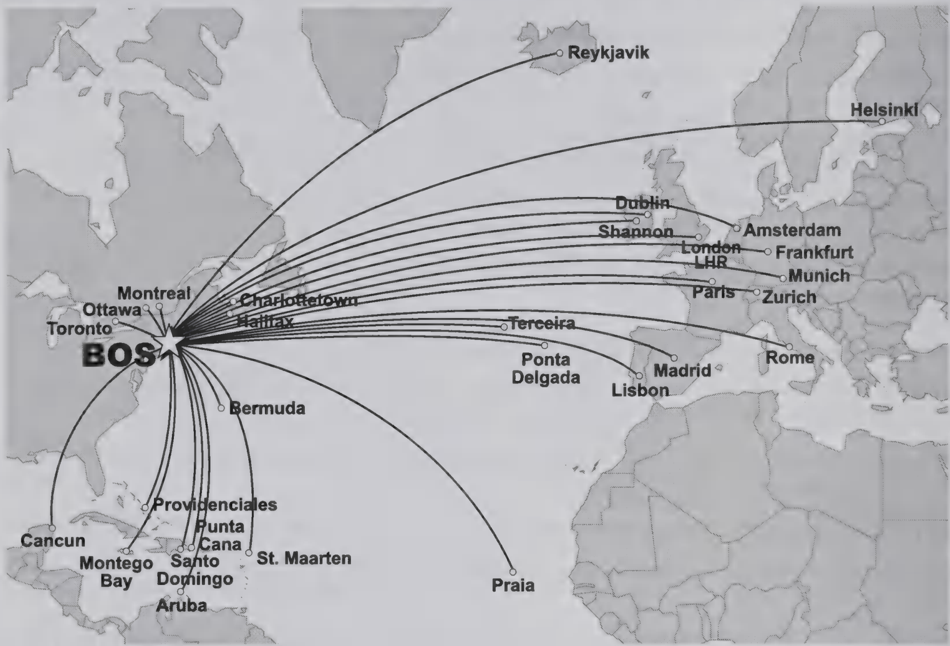
- Air Canada significantly reduced services to Halifax, Montreal, and Toronto, reducing seat capacity in the three markets by 14 percent, 22 percent, and 13 percent, respectively.
- American Airlines also cut capacity on its Toronto route (operated by American Eagle), reducing seat capacity by approximately 12 percent.

A number of service reductions also affected the European market 2009:

- Air One briefly operated scheduled service between Logan Airport and Milan in 2008, but withdrew from the market after a few months and eventually merged with Alitalia in January 2009.
- After acquiring Northwest Airlines, Delta Air Lines reduced the former Northwest Boston-Amsterdam service from twice daily to once daily.
- American Airlines significantly reduced seat capacity on its London Heathrow and seasonal Paris services.
- Foreign flag carriers Air France, Aer Lingus, and Lufthansa also reduced capacity at Logan Airport in 2009.

Logan Airport's current international service is illustrated in Figure 2-7.

Figure 2-7 International Non-stop Markets Served from Boston Logan (August 2009)



Source: OAG Market Files.

2009 Cargo Activity Levels

In 2009, Logan Airport ranked 20th among U.S. airports in total cargo volume.[3] Cargo at Logan Airport is carried in the belly compartments of passenger aircraft or by dedicated all-cargo carriers, such as FedEx, United Parcel Service (UPS), and DHL Airways in all-cargo aircraft. The express/small package segment dominates Logan Airport cargo activity, accounting for 63.1 percent of the total non-mail cargo volume. Table 2-6 shows all-cargo aircraft operations and cargo volumes at Logan Airport since 2004. In 2009, the number of all-cargo operations at Logan Airport decreased by 23.2 percent from 2008.

Total cargo volume, including mail, fell by 12.1 percent in 2009 (Table 2-6). A number of factors are responsible for the decline in cargo shipments (including freight, express and non-express mail and packages) at Logan Airport, as well as nationally, over the past several years. Cargo carriers, particularly the freight integrators that provide door-to-door delivery services and the U.S. Postal Service, have significantly increased their use of trucks to move cargo in shorter haul markets because it is more cost-effective than air. In addition, the greater acceptance and use of the internet and email has greatly reduced mail volumes. More recently, the global

3 Airports Council International, Preliminary 2009 Air Traffic Report.

recession and reduced consumer spending have contributed to the steep decline in Logan Airport's cargo volume in 2009.

FedEx carried 44 percent of the total volume of air cargo through Logan Airport in 2009 and was the 11th largest carrier at the Airport in terms of total flights. UPS was the next largest cargo operator and accounted for 14 percent of Logan Airport's cargo volume in 2009. Passenger airlines carried 36.3 percent, or 207 million pounds, of Logan Airport's cargo as belly cargo in 2009, compared to 340 million pounds that moved on all-cargo carriers.

Table 2-6 Cargo and Mail Operations and Volume

	2004	2005	2006	2007	2008	2009	Percent Change (2008-2009)
All-Cargo Aircraft Operations	9,589	8,913	8,991	8,607	8,669	6,658	(23.20%)
Volume (lbs.)[1]							
Express/ Small Packages	478,584,154	472,605,966	422,173,699	403,051,494	384,170,303	326,475,030	(15.02%)
Freight	280,690,836	268,911,342	256,894,390	229,398,281	203,601,999	191,082,152	(6.15%)
Mail	48,412,006	43,728,414	37,269,744	25,843,366	33,511,097	28,802,366	(14.05%)
Total	**807,686,996**	**785,245,722**	**716,337,833**	**658,293,141**	**621,283,399**	**546,359,548**	**(12.06%)**

Source: Massport.
1 Volume includes cargo and mail carried on passenger aircraft as well as on all-cargo aircraft.

3

Airport Planning

Introduction

This chapter describes the status of projects underway or completed at Logan Airport in 2009, and outlines plans for future projects and planning concepts that are under consideration by the Massachusetts Port Authority (Massport) or its tenants through 2020.

As discussed in *Chapter 1, Introduction/Executive Summary* of this *2009 Environmental Data Report (2009 EDR)*, any proposed project that triggers a threshold under the Massachusetts Environmental Policy Act (MEPA) or the National Environmental Policy Act (NEPA) will undergo the appropriate project-specific state and/or federal environmental review.

2009 Planning Highlights

Recent progress during 2009 included:

- Massport continued the permitting for redeveloping the Southwest Service Area (SWSA) at Logan Airport including a new consolidated rental car facility and associated uses. Consolidation of the rental car operations and their shuttle buses into a single coordinated operation will result in reduced vehicle miles traveled and the associated air emissions. A Notice of Project Change was filed for the SWSA Redevelopment Program on October 15, 2009. The primary program change involved elimination of the proposed commercial parking element of the project. This resulted in a downsizing of the structure and its relocation farther from the community. A Final Environmental Impact Review/Environmental Assessment (EIR/EA) for the project was filed in March 2010, and on May 28, 2010, the Secretary of Energy and Environmental Affairs (EEA) issued a Certificate that determined that the project adequately and properly complies with MEPA.
- Construction of a 9,300-foot long centerfield taxiway (Taxiway M) was completed and opened in summer of 2009.
- An Environmental Notification Form (ENF) was filed for proposed Logan Runway Safety Area (RSA) Improvements at Runway ends 33L and 22R on June 30, 2009, and the Secretary of EEA determined that the preparation of a Draft EIR was required. On July 15, 2010, a Draft EIR/EA for the Logan RSA Improvement Project was filed. The Secretary of EEA is expected to issue a Certificate on the Draft EIR on or about September 24, 2010.

- Preliminary design of a proposed Green Bus Depot for bus maintenance in the North Service Area (NSA) began in 2009. An expanded ENF for the Green Bus Depot was filed on July 15, 2010. The Secretary of EEA is expected to issue a Certificate on the ENF on or about September 17, 2010.
- Massport published Sustainable Design Standards and Guidelines (SDSG) for use by architects, engineers, and planners working on capital improvement projects for Massport facilities.
- Planning commenced for two hangar upgrades.
- Terminal B Garage repair and rehabilitation commenced. Solar panels were installed on the roof of the Terminal B garage.
- Planning commenced for the Logan Airport Parking Deck Project on the Robie Parcel in the North Cargo Area (NCA). Construction began in spring 2010.
- An extension to Taxiway D was completed.
- Taxiway G realignment construction commenced.
- Planning for the NSA Roadway Corridor Project began. The NSA Roadway Corridor Project coordinates the roadway and urban design vision for North Service Road and Frankfort Street with on-going design and construction efforts in the NSA. The project will coordinate the Logan Airport Parking Deck Project, East Boston-Chelsea Bypass Project, the SWSA Redevelopment Project, and the NSA Buffer Project to develop a unified utility, roadway, and landscape vision for the NSA roadway corridor between Prescott Street and Neptune Road.
- Planning for the East Boston-Chelsea Bypass project commenced to develop a limited access roadway between Logan Airport and the new Chelsea Street Bridge. An ENF is planned for fall of 2010.

Terminal B Garage renovations include solar trees and efficient LED lighting.

Table 3-1 provides a summary of the status of each project and planning concept, as of December 31, 2009. Descriptions are provided in subsequent sections of this chapter.

Table 3-1 Logan Airport Projects and Planning Concepts 2009

Description	Status	Completion By 2015	Completion By 2020
Terminal Area Projects/ Planning Concepts			
Terminal E, Phase 1 and Phase 2	C	✓	
Terminal E, Future Phase (West Concourse)	D		✓
Massport Satellite FIS Facility Project	H		
American Airlines Terminal B, Pier A Improvements Project	H		
Terminal B Garage Repair and Rehabilitation	U	✓	
Service Area Projects/ Planning Concepts			
Relocated CNG Station in the NCA	E		✓
Consolidated Maintenance Facilities in the NCA	C		
Replacement Cargo Facilities in the NCA	E		✓
Replacement American Airlines Hangar in the NCA	H		✓
Replacement Hangar Facilities in the NCA	H		✓
New/Replacement GSE Consolidated Facility in the NCA	E		✓
Green Bus Depot in the NSA	R	✓	
Flight Kitchen Consolidation in the NSA	E	✓	
SWSA Program (Consolidated Car Rental Facility)	D	✓	
NSA Roadway Corridor Project	E	✓	
Airport Parking Projects/ Planning Concepts			
NSA Economy Parking Consolidation	H		
Logan Airport Parking Deck Project in the NCA	U	✓	

Description	Status	Completion By 2015	Completion By 2020
Airside Area Projects/ Planning Concepts			
Runways 22R and 33L Runway Safety Area Improvements	R	✓	
Logan Airside Improvements Planning Project			
Runway 14-32 Construction	C		
Taxiway Improvements	C/U	✓	
Centerfield Taxiway	C		
Taxiway Delta Extension	C		
Taxiway G Realignment	U	✓	
Governors Island Aircraft Parking	H		
Buffer Projects/ Planning Concepts			
SWSA Buffer	C (Phase 1)/ D (Phase 2)[1]	✓	
NSA Buffer	D	✓	
Bremen Street Park	C		
Airport-Wide Projects/ Planning Concepts			
Logan Airport Wayfinding System	U[2] D		
East Boston-Chelsea Bypass	E	✓	

Notes: Anticipated completion dates and status as of December 31, 2009.
Details of each project or planning concept are provided in the sections that follow.

C – Completed prior to or during 2009
D – Project in design, or awaiting funding
E – Planning concepts undergoing evaluation and/or feasibility analysis
H – Project or planning concept on hold
R – Project undergoing MEPA, Federal Aviation Administration (FAA), or other review
U – Project under construction
1 – Phase 2 of the SWSA Buffer is included as part of the Southwest Service Area Redevelopment Program Final Environmental Impact Report/Environmental Assessment (EIR/EA)
2 – Guidelines implemented as part of terminal and roadway projects

FIS – Federal Inspection Services
CNG – Compressed Natural Gas
NCA – North Cargo Area
GSE – Ground Support Equipment
NSA – North Service Area
SWSA – Southwest Service Area

Terminal Area Projects/Planning Concepts

The terminal area accommodates most of the passenger functions at Logan Airport including the passenger terminals, terminal area roadways, central parking facilities, and the Hilton Hotel. Table 3-2 presents information on the status of each ongoing terminal area project. In addition, both Massport and its tenants at Logan Airport are proposing projects or exploring planning concepts to modernize and carry out future improvements to the existing terminal facilities. These potential future planning concepts are also detailed in Table 3-2. The location of the ongoing terminal area projects and the planning concepts that may potentially be constructed in the future are shown on Figure 3-1.

Figure 3-1 Location of Projects/Planning Concepts in the Terminal Area

Note: See Table 3-2 for numbered projects

Table 3-2 Description and Status of Projects/Planning Concepts in the Terminal Area (as of December 31, 2009)

Description	Status
Massport Projects/Planning Concepts	
1. International Gateway Project (Terminal E) The International Gateway Project expands and upgrades Terminal E to provide better service to international passengers. This project is being constructed in phases:	
Phase 1 – This phase of the project included a weather-protected outside airside bus portico with an elevator and escalator linking the ground floor with the second floor to accommodate passengers arriving from remotely parked aircraft that are unable to park at a gate because it is occupied by another aircraft.	Completed in 2004.
Phase 2 – This phase of the project enlarges Logan Airport's congested Federal Inspection Services (FIS) Facility, and improves the meeter/greeter lobby and the ticketing area of Terminal E to maximize passenger convenience and reduce processing times in the terminal. The project reconstructs and expands Terminal E in and around the existing terminal while keeping it operational and safe.	Completed in 2007.
Future Phase – This phase involves the construction of a new West Concourse, which will add three new gates to Terminal E to accommodate wide body aircraft.	Initial work on the Future Phase (new West Concourse) was completed as part of an airport-wide in-line baggage screening project in 2004. The remainder of the future phase is included in Massport's long-term capital plan.
2. Massport Satellite FIS Facility Improvements Project To accommodate more efficiently the potential growth of the international market, Massport proposed to construct a new satellite FIS Facility at the southeast end of Terminal B, Pier A.	Massport and American Airlines filed a joint Environmental Notification Form (ENF) on May 31, 2000 (EOEA #12235), a Draft Environmental Impact Report (DEIR) on May 9, 2001, and a Final Environmental Impact Report (FEIR) on June 23, 2001. On August 24, 2000, the Federal Aviation Administration (FAA) determined that the projects are categorically excluded from the need to prepare an Environmental Assessment (EA) under NEPA, and that the projects meet the General Conformity requirements of the Clean Air Act, as amended.[1] Due to the financial impacts of September 11, 2001, design and construction of the Terminal B FIS Facility has been placed on hold indefinitely.

New Terminal E Departures Lobby, completed in 2007.

1 Letter from John Silva, Manager, Environmental Programs, Federal Aviation Administration, New England Region, to Ken Hietbrink, American Airlines, and Betty Desrosiers, Massport. Dated August 24, 2000.

Table 3-2 Description and Status of Projects/Planning Concepts in the Terminal Area (as of December 31, 2009) (Continued)

Description	Status
Tenant Projects/Planning Concepts	
3. Terminal B Walkway Extension Massport considered extending the elevated walkway that connects the northwest corner of Terminal B to the US Airways entrance on the west side of Terminal B.	This project is currently on hold.
4. Terminal B Garage Repairs Routine structural repairs and garage lighting upgrades. Installed solar panels on garage roof.	This project includes routine maintenance. Final design, bid, and building permits issued. Construction is underway. The roof solar panels will reduce energy consumption and improve air quality. Further details on these energy savings are described in *Chapter 1, Introduction/Executive Summary.*

Note: See Figure 3-1 for the location of terminal area projects/planning concepts.

Service Area Projects/Planning Concepts

Logan Airport's service areas contain airline support businesses and operations. Land uses in the service areas continually evolve in response to changing airline business, customer, and tenant needs, as well as the Central Artery/Tunnel (CA/T) Project and other public works projects. Massport continues to explore more efficient ways of using the limited land resources in the service areas. The five service areas at Logan Airport are shown in Figure 3-2 and are described below:

- **North Cargo Area** (NCA) is located in Logan Airport's northwest corner. It is bounded by the main Logan Airport outbound roadway to the south, Route 1A to the west, the Jet Fuel Storage Facility to the north, and the airside apron area to the east. The NCA, which is situated adjacent to the airside area of Logan Airport, is Logan Airport's primary airline support area. It accommodates air cargo and essential airline support businesses including hangars, ground service equipment (GSE) maintenance, and aircraft parking. The NCA is the most appropriate location for businesses and operations that require contiguous airside access and for businesses such as cargo that require adjacent landside as well as airside access. The NCA is the likely location for future hangar expansion either between or in the vicinity of the American Airlines and Delta Air Lines hangars, for replacement cargo buildings and for aircraft parking to accommodate changes in aircraft fleet over time. In the near-term, portions of the NCA will continue to be used for interim economy parking.
- **North Service Area** (NSA) is located north of the NCA near the Massachusetts Bay Transportation Authority's (MBTA) Wood Island Station and Runway 15R-33L. The NSA includes flight kitchens, weather and navigation equipment, construction staging areas, and overflow economy parking. Portions of the NSA are being planned for a bus maintenance facility, a temporary bus/limousine pool, and an airport edge buffer. Permitting has been initiated for the proposed Green Bus Depot.
- **Southwest Service Area** (SWSA) is located south of Logan Airport's main access roadway, and is bounded on the east by Harborside Drive. Because of its proximity to the terminals and the regional highway system, the SWSA functions as Logan Airport's primary ground transportation hub. Current surface operations include the taxi pool, bus/limousine pool, and rental car operations. The entire SWSA will be redeveloped to accommodate a consolidated car rental facility and associated activities. Relocation of a flight kitchen located in the SWSA to an existing vacant flight kitchen facility in the NSA is also planned.

- **Bird Island Flats/South Cargo Area (BIF/SCA)** is located south and southeast of the Logan Airport's SWSA, and is generally bounded on the south by Boston Harbor and on the east and north by Logan Airport's airside area. The BIF/SCA is two service areas connected by Harborside Drive. The BIF portion has landside access via Harborside Drive and water access via the system of water taxis that shuttle passengers between Downtown Boston, the South Shore, and Logan Airport. BIF development includes the Hyatt Hotel and Conference Center, the Logan Office Center and adjoining garage, an employee parking lot, the Water Shuttle Dock, the Logan Airport Rescue and Fire Fighting Facility Marine Dock, and the Harborwalk that is a publicly accessible promenade along the harbor's edge. The SCA portion is Logan Airport's primary cargo area. It provides landside access and secured airside access. It also accommodates domestic and some international cargo operations and temporary relocation of the taxi pool during SWSA redevelopment.
- **Governors Island (GI)** is located at Logan Airport's southern tip and is bounded by Runway 14-32 and Boston Harbor to the east and south, by Runway 4R to the west, and Runway 9 to the north. GI has functioned as a storage site for the CA/T Project and for construction stockpiles. The area also contains an Aircraft Rescue and Fire Fighting Facility training area, parking for snow removal equipment, a biocell remediation area, and Federal Aviation Administration (FAA) aircraft navigation equipment. The area is being considered as a location of remain over night (RON) aircraft parking.

Table 3-3 presents information on the status of each ongoing project and planning concept in the service areas. Both Massport and Logan Airport tenants are proposing projects or exploring planning concepts to modernize and carry out future improvements to the service areas. These potential future planning concepts are also detailed in Table 3-3. The location of the ongoing service area projects and planning concepts that may potentially be constructed in the future are shown on Figure 3-3.

Renderings of the proposed ConRAC facility.

Figure 3-2 Logan Airport Service Areas

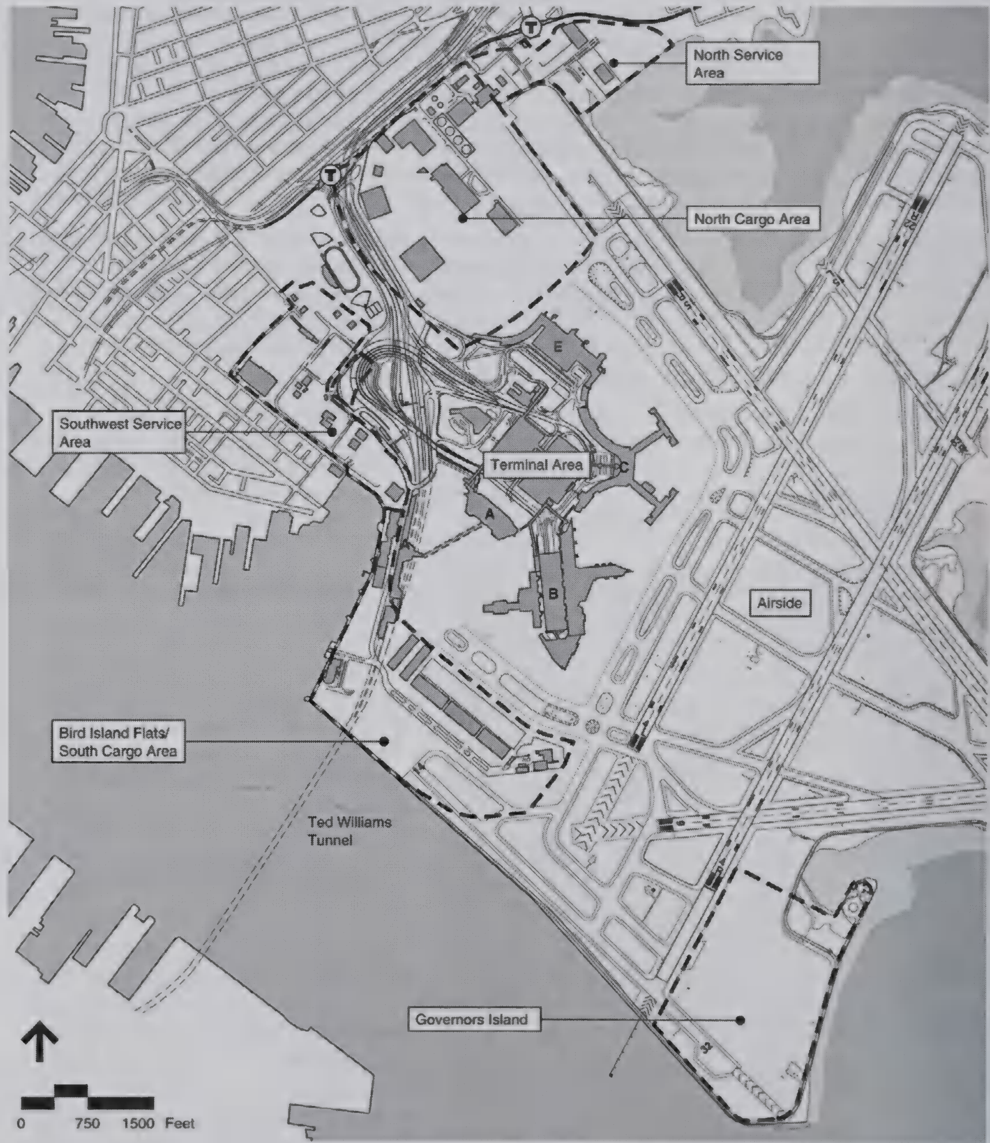


Figure 3-3 Location of Projects/Planning Concepts in the Service Areas

Note: See Table 3-3 for numbered projects

Table 3-3 Description and Status of Projects/Planning Concepts in the Service Areas (as of December 31, 2009)	
Description	**Status**
Massport Projects/Planning Concepts	
1. Southwest Service Area (SWSA) Redevelopment Program The SWSA Redevelopment Program will consolidate on-airport rental car operations and facilities into one integrated facility to better serve both the tenants and the traveling public, to reduce ground transportation and air quality impacts on-airport and in the surrounding neighborhoods, and to reduce associated off-airport impacts. Redevelopment of the SWSA is needed because the existing SWSA and rental car facilities are inefficient and are not adequate to meet Massport's or the rental car companies' future needs. The SWSA Redevelopment Program will replace and upgrade existing uses within the SWSA. The development will include a Consolidated Car Rental Facility (ConRAC with a four-level, garage to accommodate rental car storage, four support facilities for the car rental operations, a common bus system, a reconfigured taxi pool, and roadway improvements, pedestrian and bicycle facilities, and landscaping. The commercial parking component of the garage has been eliminated (as per Notice of Project Change (NPC) filed with MEPA). Key components include a Leadership in Energy and Environmental Design® (LEED) certified consolidated rental car garage and customer service center, quick turn-around maintenance and service facilities; a new clean-fuel unified shuttle bus system; relocated and reconfigured taxi pool and bus and limousine pool; some long-term overflow commercial surface parking, and pedestrian and bicycle facilities, and site landscaping. Construction of the ConRAC facilities will be preceded by numerous enabling activities that reorganize the SWSA through multiple sub-phases allowing for enough of the site to be cleared for staging and construction. Some of these enabling projects include reorganization of rental operations within the SWSA. Other projects include temporary relocation of ground transportation operations for a limited time period, including the Taxi Pool to Lot B, the Cell Phone Lot (currently at Lot B) to an existing open parking lot across from the Logan Airport gas station, and the Bus and Limousine Pool to the NSA. New traffic signalization will also facilitate the construction of the SWSA including a new traffic signal at the intersection of Frankfort Street and Lovell Street and at the intersection of Harborside Drive and Hyatt Drive. Phase 2 of the SWSA Buffer (EEA #14137) (see Table 3-5) will be integrated with the proposed SWSA Redevelopment Program.	A Final Environmental Impact Review/Environmental Assessment (EIR/EA) was prepared in accordance with the Secretary of EEA's Certificate on the NPC. The Final EIR/EA was filed on March 1, 2010. An extended comment period closed on May 24, 2010. The Secretary's Certificate finding that the Final EIR adequately and properly complies with MEPA was issued on May 28, 2010. The project is now in final design and a contractor has been selected, Several of the enabling projects are underway. .

Table 3-3 Description and Status of Projects/Planning Concepts in the Service Areas (as of December 31, 2009) (Continued)

Description	Status
Massport Projects/Planning Concepts	
2. Relocated Compressed Natural Gas (CNG) Station in the North Cargo Area (NCA) This would involve the relocation of Massport's existing CNG Station to accommodate the airside operations in the NCA.	Massport continues to examine several potential on-Airport parcels for relocation of the existing CNG station. Relocation is not expected to occur before 2015.
3. Consolidated Maintenance Facilities in the NCA This project involved the construction of a new vehicle storage building in the NCA to provide better storage capacity for essential snow maintenance equipment. Phase 1 provided covered storage for large snow equipment adjacent to Facilities Building # 2. Existing deicing fluid tanks were replaced with larger capacity tanks on an adjacent area. Phase 2 involved major rehabilitation of the existing Facilities Building # 2. The project was below MEPA review thresholds.	Phase 1 construction began in 2006 and was completed in fall 2008 when Phase 2 construction commenced. Phase 2 was completed in 2009.
4. Replacement Cargo Facilities in the NCA Construction of new cargo facilities in the NCA would compensate for the loss of cargo facilities that resulted from the Central Artery/Tunnel (CA/T) Project, as well as for the projected growth in cargo demand.	The project remains under evaluation. If a decision is made to proceed with this project, construction would likely commence after 2015.
5. North Service Area (NSA) Roadway Corridor Project The NSA Roadway Corridor Project coordinates the roadway and urban design vision for North Service Road and Frankfort Street with on-going design and construction efforts in the NSA. The project will coordinate with the NCA Logan Airport Parking Deck Project, East Boston-Chelsea Bypass Project, the SWSA redevelopment enabling projects and the NSA Buffer Project to produce a unified utility, roadway, and landscape vision for the NSA roadway corridor between Prescott Street and Neptune Road.	Evaluation of planning concepts underway in 2009.

Rendering of the ConRAC facility, as viewed from Harborside Drive.

Table 3-3 Description and Status of Projects/Planning Concepts in the Service Areas (as of December 31, 2009) (Continued)

Description	Status
6. Replacement American Airlines Hangar in the NCA This proposal would involve the renovation of portions of the American Airlines Hangar to keep it operational until demolition and reconstruction planning can be completed. Roof, mechanical systems, and restrooms are top priorities for renovation. Ultimately the existing 97,000-square foot American Airlines Hangar would be demolished and replaced with a new hangar that could accommodate Group V aircraft.	Planning and design for this proposal has been placed on hold indefinitely. If a decision is made to go ahead with this project, construction would not likely commence until after 2015.
7. Replacement Hangar Facilities in the NCA Construction of new hangar facilities in the NCA would be required to compensate for the loss of hangar facilities that resulted from the CA/T Project, as well as for the projected demand for hangar space.	Evaluation of this planning concept has been placed on hold. If planning resumes, construction would not likely commence until after 2015.
8. Green Bus Depot in the NSA The proposed Green Bus Depot will occupy a 7.7-acre site in the North Service Area and will be shielded from the community by an extensive landscape buffer. The new facility will service the new fleet of clean-fuel shuttles buses including approximately 30 hybrid-electric buses and 20 CNG buses. The new maintenance facility will allow the bus fleet to remain on the airport instead of traveling to Chelsea where current maintenance facilities are located. Access to the facility would be from the existing roadway system. LEED Silver certification will be pursued for the facility.	An expanded ENF was filed with MEPA in July 2010 and construction is anticipated in 2011.
Tenant Projects/Planning Concepts	
9. Flight Kitchen Consolidation in the NSA This project would consolidate existing on-Airport operations in the NSA.	Due to changes in the flight kitchen industry post-September 11, 2001, expansion of flight kitchen facilities is not anticipated. Initial consolidation of the flight kitchen functions occurred in 2005 with the consolidation of the LSG SkyChef facilities into one building in the NSA, leaving one adjacent flight kitchen facility vacant. It is anticipated that the inactive flight kitchen in the NSA will be reactivated by 2011.
10. New/Replacement Ground Support Equipment (GSE) Consolidated Facility in the NCA This planning concept would provide multi-tenant maintenance facilities for GSE.	If the conceptual planning for the proposal moves beyond feasibility screening, construction would not likely commence until after 2015.

Note: See Figure 3-3 for the location of service area projects/planning concepts.

Airside Area Projects/Planning Concepts

The airside area includes all Logan Airport land from the edge of the terminal buildings to the Logan Airport harbor boundary, incorporating the Logan Airport apron, runways, gates, and other airfield operating facilities. Airside improvements include upgrades and improvements to the airfield to enhance the operational efficiency and safety of Logan Airport. Table 3-4 describes the status of projects (shown on Figure 3-4) and planning concepts under consideration for Logan Airport's airside area as of December 31, 2009.

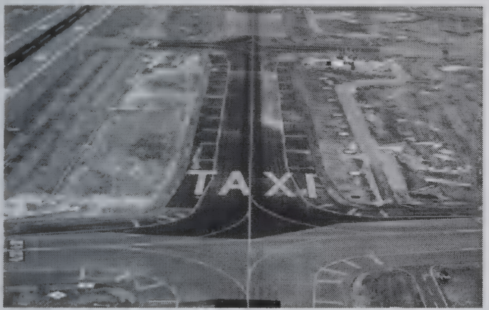
Figure 3-4 Location of Projects/Planning Concepts on the Airside

Note: See Table 3-4 for numbered projects.

Table 3-4 Description and Status of Projects/Planning Concepts on the Airside (as of December 31, 2009)

Description	Status
1. Runway 22R and 33L Runway Safety Area (RSA) Improvements The FAA requires RSAs to accommodate aircraft overruns, undershoots, and veer-offs in emergency situations. Massport is continuously looking for opportunities to increase the margin of safety for all runways and where practicable providing FAA standard RSAs at all locations. At Logan Airport, the FAA standard RSA is typically 500 feet wide by 1,000 feet long at each runway end. Where this space is not available, the FAA has approved the use of Engineered Materials Arresting System (EMAS) for aircraft overrun protection. EMAS uses a system of collapsible concrete blocks that can stop an aircraft by exerting predictable forces on the landing gear while minimizing aircraft damage. In 2004, the FAA approved installation of a 190-foot section of EMAS at Runway 22R. The FAA also directed Massport to evaluate opportunities for additional safety enhancements at this location. Massport installed a 158-foot of EMAS at Runway 33L in 2006, in anticipation of full environmental review of additional improvements. A detailed alternatives analysis was conducted to evaluate options for safety enhancements at both runway-ends. As described in the 2009 ENF and 2010 Draft Ground Support Equipment (EA/EIR), an Inclined Safety Area (ISA) similar to what was constructed at Runway-End 22L is proposed for Runway-End 22R. A pile-supported deck approximately 450 feet long by 300 feet wide is proposed for Runway-End 33L.	Construction of an EMAS bed at Runway 22R was completed in 2005. An interim EMAS bed was installed at Runway 33L in 2006. Evaluation of additional safety enhancements for the RSAs at both runway ends are now being advanced as a separate project. Massport filed an ENF with MEPA on June 30, 2009 that describes the proposed RSA enhancements at both runway ends. A Draft EA/EIR was filed on July 15, 2010. An extended public comment period was underway at the time this EDR was in production. The *2010 EDR* will provide a full update on the RSA Improvements project status. Construction is expected to commence in 2011 once all environmental approvals are obtained. Note: The proposed RSA enhancements at Runway 33L will replace the RSA improvement that was planned and permitted (but not constructed) for this location as part of EOEA# 5122.
2. Logan Airside Improvements Planning Project The project involves construction of a new unidirectional Runway 14-32, centerfield taxiway, extension of Taxiway D, realignment of Taxiway N, improvements to the southwest corner taxiway system, relocation of cargo buildings, and reduction in approach minimums on Runways 22L, 27, 15R, and 33L. These airfield improvements were intended to reduce current and projected levels of aircraft delay and enhance airfield safety at Logan Airport. The sub-components of this project, as described in the *Airside EIS/EIR*, are presented below along with the associated status.	
a. Demolition and relocation of Cargo Buildings 60 and 61.	This component of the project was completed in 2006.
b. Construction of a new unidirectional 5,000-foot Runway 14-32.	Construction began in 2004, and continued through 2006. The new Runway 14-32 became operational on November 23, 2006. The first full year of operation of Runway 14-32 was 2007.
c. Construction of a Taxiway D straightening and realignment, and southwest corner taxiway realignment and the installation of all lighting, marking, signage, and drainage to support these improvements.	The southwest corner taxiway realignment component of the project was completed in 2007. The Taxiway D extension was fully constructed in 2009.
d. Straightening and realignment of Taxiway N.	This project component is anticipated to commence after 2010.

Table 3-4 Description and Status of Projects/Planning Concepts on the Airside (as of December 31, 2009) (Continued)

Description	Status
e. Construction of a 9,300-foot long centerfield taxiway that would be located between and parallel to Runway 4L-22R and Runway 4R-22L.  **Completed centerfield taxiway.**	As part of its Record of Decision (ROD) for the Airside Improvements Planning Project under NEPA, the FAA deferred its decision on centerfield taxiway (Taxiway M) pending an operational review to identify any other potential beneficial actions. The FAA directed the technical work on the operational review and conducted briefings with a citizen panel. The FAA divided the study into two phases. Phase 1 focused on current conditions and Taxiway November, and Phase 2 included operations with both Taxiways November and the centerfield taxiway. Both of these Phases were completed and the public comment period on the project ended in September of 2007. The FAA approved the centerfield taxiway in April, 2007. Construction of the centerfield taxiway began in the spring of 2008 and was completed in August of 2009. The centerfield taxiway is being used as intended by the EIS for taxiing for long-haul domestic and international flights using Runway 22L and to improve flow on the airfield and reduce taxiway congestion. For the project, Massport used an innovative method to pave the taxiway with warm mix asphalt, which reduces energy consumption and has air quality benefits.
f. Reduction in approach minimums on Runways 22L, 27, 15R, and 33L by FAA.	Reduction in approach minimums on Runway 15R and 33L was approved in the Airside EIS/EIR. Implementation will be affected by realignment of the Instrument Landing System (ILS) localizer. Construction impacts of relocation of the ILS localizer are being addressed in the ongoing EA/EIR for the proposed enhancements to the RSA at the end of Runway 33L. (See above).
3. Governors Island Aircraft Parking Massport has considered providing additional aircraft parking at Governors Island for the following: (1) Remain over night (RON) aircraft; (2) Cargo Aircraft; and (3) International aircraft. RON aircraft are generally commercial passenger aircraft that fly into the airport at night and fly out in the morning. Airlines sometimes schedule and position more aircraft than there are gate positions, therefore remote aircraft parking positions are required. Remote aircraft parking is appropriate for cargo aircraft that generally arrive in the morning and remain on the ground until their late evening departure. Finally, some international scheduled and charter aircraft that have long turnaround times should be parked remotely when there is a high demand for gates.	Preliminary concepts evaluated by Massport involve the development of 20 to 50 aircraft positions and ancillary uses. If the concept is deemed feasible and planning continues, it is anticipated that construction would occur after 2015.

Note: See Figure 3-4 for the location of airside projects/planning concepts.

Airport Buffer Areas

Massport has committed up to $15 million for the planning, construction, and maintenance of buffer areas around Logan Airport. Three buffers have been completed, including the Bayswater Buffer, Navy Fuel Pier Buffer, and SWSA Buffer Phase I. These areas are located generally along the Logan Airport's perimeter boundary and are intended to provide attractive landscape buffers between airport operations and adjacent East Boston neighborhoods. The buffer design occurs in consultation with Logan Airport's neighbors and other interested parties in an open community planning process. To collaborate in East Boston open space planning, Massport also participates in meetings with other agencies including MassDOT, the City of Boston and the MBTA. Table 3-5 describes the status of ongoing buffer projects and other Massport greenspace projects under consideration as of December 31, 2009. Figure 3-5 shows the location of these buffer projects.

Figure 3-5 Location of Airport Edge Buffer Projects/Planning Concepts

Note: See Table 3-5 for numbered projects.

Table 3-5 Description and Status of Airport Edge Buffer Projects/Planning Concepts (as of December 31, 2009)	
Description	**Status**
1. SWSA Buffer	
Phase 1 of this project involves the construction of an approximately half-acre linear area with landscaping and lighting improvements along Maverick Street that will include evergreen and deciduous trees, ornamental shrubs, and groundcovers.	Phase I construction was completed in the fall of 2006.
Phase 2 of this project involves additional landscaping and solid barriers.	Phase 2 of the SWSA Buffer will be integrated with the SWSA Redevelopment Program. Phase 2 consists of installing landscaping (i.e., densely planted or planted atop earth berms for enhanced separation) and solid barriers such as fences and walls. The Secretary's Certificate on the SWSA Redevelopment Project Final EIR was issued on May 28, 2010.
2. NSA Buffer (Neptune Road Buffer)	
The NSA Buffer involves landscape improvements along the airport edge. The NSA Buffer will involve significant landscape beautification and improved pedestrian connections, primarily on the Massport parcel located at the intersection of Neptune Road and Vienna Street.	Massport selected a design consultant in May 2009 and expects to begin the community planning process in the fall of 2010. Construction is anticipated to commence in 2011.
3. Navy Fuel Pier Buffer	
The Navy Fuel Pier Buffer project began with the Army Corps of Engineers' (ACOE) remediation of the former Navy Fuel Pier, which was completed in 2001. The project involved beautification of the property (0.7 acres) through landscape improvements and stabilization of the waterfront perimeter.	Final construction of the buffer was completed in 2007.
4. Bayswater Embankment	
This project involved creation of a landscaped buffer between Bayswater Street and Boston Harbor.	Construction of this airport edge buffer was completed in 2003.
5 Bremen Street Park	
The 18-acre Bremen Street Park was constructed by the CA/T Project as East Boston's second largest neighborhood park. The park contains a variety of facilities, a direct pedestrian connection to MBTA's new Blue Line Airport Station, and a half-mile segment of the three-mile East Boston Greenway. The park was built on land previously used as off-airport parking.	Final construction of the park was completed in 2008.

Note: See Figure 3-5 for the location of airport edge buffer projects/planning concepts.

The Navy Fuel Pier Buffer project, completed in 2007.

Airport Parking Projects/Planning Concepts

The total number of employee and commercial parking spaces permitted at Logan Airport is limited by the Logan Airport Parking Freeze under the State Implementation Plan (SIP). Historically, parking supply at Logan Airport has varied in terms of the specific locations and sizes of individual lots, the mix of parking spaces for air travelers and employee spaces, and the number of spaces in and out of service at any one time due to construction projects being undertaken at Logan Airport, while at all times remaining in compliance with the Logan Airport Parking Freeze. *Chapter 5, Ground Transportation* contains additional information on the historic and existing supply of parking at Logan Airport.

Table 3-6 describes current commercial parking projects at Logan Airport. The locations of parking projects are shown on Figure 3-6.

Table 3-6 Description and Status of Airport Parking Projects/Planning Concepts (as of December 31, 2009)

Description	Status
1. **North Service Area (NSA) Economy Parking Consolidation (EOEA#13456)** As originally envisioned, the project would redevelop three parcels, totaling ±15.7 acres, into a combined economy parking lot with the capacity for up to 1,750 vehicles. This project would entail reusing existing paved parking areas, relocating a Massport equipment storage area, redeveloping the site for economy parking, and encircling the new parking lot with a security fence and an attractive landscape edge. By consolidating existing parking from other on-airport locations, the project would remain within the limits of the Logan Airport Parking Freeze.	The NSA Economy Parking Consolidation project is no longer being planned. The site is being considered for a bus maintenance facility, which is undergoing MEPA review (see details in Table 3-3).
2. **Logan Airport Parking Deck Project in the NCA (North Cargo Area)** This involves construction of an interim two-level deck above the existing surface economy parking lot on the Robie Parcel in the NCA. The two decks will facilitate consolidation of existing temporary parking at various on-airport locations to one location. The parking consolidation will result in significant customer service improvements, operational and environmental benefits including reduced vehicle miles traveled with associated air quality benefits. As discussed in *Chapter 5, Ground Transportation*, the Parking Deck Project is fully consistent with the Logan Parking Freeze.	On June 23, 2010, EEA issued an Advisory Opinion confirming that no MEPA review was required for this parking consolidation. Some of the relocated parking is expected to be completed in late 2010, with the remainder available in 2011. *Chapter 5, Ground Transportation* describes how the parking consolidation will be managed in accordance with the Logan Parking Freeze.

Note: See Figure 3-6 for the location of airport parking projects/planning concepts.

Figure 3-6 Location of Airport Parking Projects/Planning Concepts

Note: See Table 3-6 for numbered projects.

Airport-wide Projects

Massport regularly plans and implements airport-wide projects/planning concepts such as those described in Table 3-7.

Table 3-7 Description and Status of Future Airport-wide Projects/Planning Concepts (as of December 31, 2009)

Description	Status
1. Logan Airport Wayfinding System This project provides a comprehensive wayfinding system for Logan Airport facilities including terminals, terminal curbside, parking garages, and approach roadways including airport wide signage analysis and planning, development or design guidelines and graphic standards, and a master implementation plan for future projects.	Ongoing
2. The East Boston- Chelsea Bypass (Dedicated Airport Access Road) This bypass is being planned as a new roadway connection between Logan Airport and the Chelsea Street Bridge following an abandoned rail corridor. The Bypass roadway is for airport access only and is not intended for public access. The Bypass roadway will provide a means to remove airport traffic (trucks, cargo vehicles, parking shuttles, and transit buses, etc.) from the local road system. The bypass road is expected to reduce congestion on local East Boston streets in the vicinity of Day Square, Eagle Square, and the Neptune Road corridor. The Bypass will also be used by MBTA transit vehicles and will serve as an initial link in the Commonwealth's planned Urban Ring.	An Environmental Notification Form (ENF) is being prepared to commence the state-level environmental review process. The ENF is expected to be filed in fall of 2010, with project construction anticipated to begin by 2011.

Logan Airport Wayfinding system includes roadway signage.

4

Regional Transportation Context

Introduction

This chapter reports on the status of the New England regional airports in 2009 and describes Massachusetts Port Authority's (Massport) ongoing efforts to support an efficient regional air transportation network. The ten primary regional airports considered in this chapter are: T.F. Green Airport, Rhode Island (RI); Manchester-Boston Regional Airport, New Hampshire (NH); Bradley International Airport, Connecticut (CT); Burlington International Airport, Vermont (VT); Bangor International Airport, Maine (ME); Portland International Jetport, ME; Portsmouth International Airport[1] in Portsmouth, NH; Worcester Regional Airport, Massachusetts (MA); Hanscom Field, MA; and Tweed-New Haven Airport, CT. The chapter specifically describes:

- Airport passengers and aircraft operations for the regional airports in 2009, activity level changes over the prior year, and a comparison to activity levels and growth at Logan Airport.
- Changes in airline service levels and other factors that have contributed to trends in regional airport activity.
- Status of improvement plans and projects at the regional airports.
- Massport's initiatives and joint efforts with other transportation agencies to improve the efficiency of the New England regional transportation system.

Key Findings

The following trends and achievements affecting the regional transportation context in New England occurred in 2009:

- The total number of air passengers utilizing New England's primary commercial service airports, including Logan Airport, decreased from 44.4 million in 2008 to 42 million in 2009. This represents a passenger traffic decline of 5.4 percent. In the region, activity levels as measured by the number of aircraft operations fell by 14.2 percent, from 1.21 million operations in 2008 to 1.03 million operations in 2009. The decreases in

1 Formerly known as Pease International Tradeport.

passenger traffic and aircraft operations at New England airports reflect national trends resulting from the worsening global economic recession and the sharp decline in air travel demand.

- Of the 42 million air passengers using New England's primary commercial service airports, 61 percent of air passengers used Logan Airport, a slight increase from 59 percent in 2008.
- Air passenger traffic at the regional airports in New England declined, as the challenging operating environment for airlines affected smaller communities disproportionately. Airlines introduced major reductions in operations throughout the year, eliminating less profitable routes and cutting frequencies in smaller markets. Low-cost carriers (LCCs), such as Southwest Airlines and JetBlue Airways, also stopped expanding their operations at regional airports in recent years, and are now instead focusing on expansion in larger air service markets with a strong business travel portfolio.
- Passenger levels at the regional airports declined by 9.8 percent in 2009, compared to a decline of 2.3 percent at Logan Airport and an overall decline of 5.3 percent in the U.S. domestic market.[2]
- General Aviation (GA) operations in the New England region were down 19.4 percent from 2008 levels. GA operations declined by 17.9 percent at the regional airports and by 48.6 percent at Logan Airport. Declines in GA activity in New England mirrored sharp reductions in GA across the nation, as the economic downturn led to corporate travel budget cuts and a drop off in price-sensitive recreational flying. According to the Federal Aviation Administration (FAA), GA activity fell by 11.7 percent nationally in 2009.
- Massport continued negotiations with the City of Worcester to purchase Worcester Regional Airport. In June 2010, the City of Worcester transferred the airport to Massport for $17 million.
- Massachusetts enacted transformative transportation legislation through the "Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts." The 2009 Act combines formerly separate transportation agencies within the Commonwealth into one state agency, the Massachusetts Department of Transportation (MassDOT), with the intent of encouraging an efficient transportation system, and coordination of multi-modal surface transportation policy and investment. As part of this legislation, ownership and control of the Tobin Bridge was transferred to MassDOT from Massport.

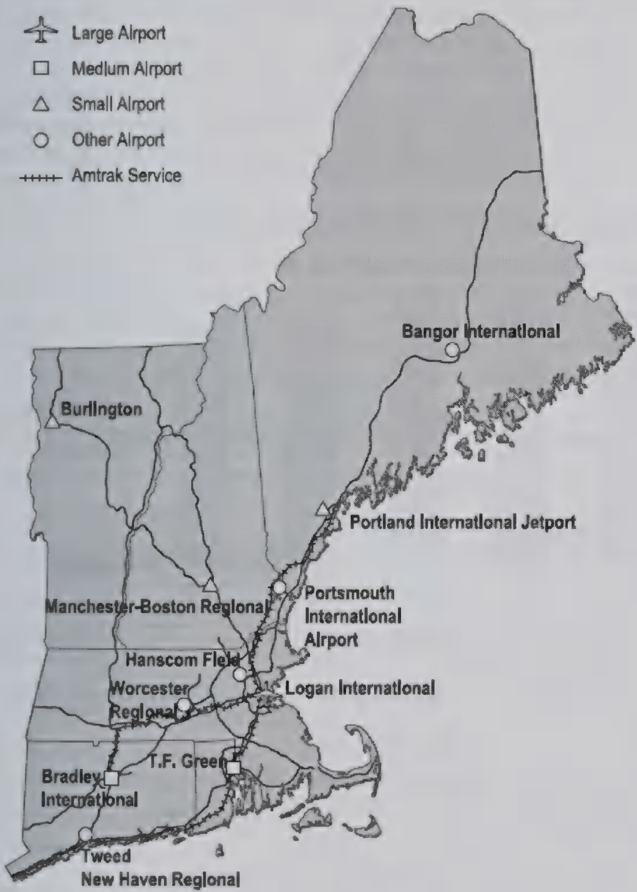
New England Regional Airport System

As shown in Figure 4-1, the New England region is served by Logan Airport, the primary international hub and domestic destination, and a system of ten regional commercial service airports[3] (regional airports); together, these 11 airports accommodate nearly all of New England's air travel demand. The regional airports range in activity levels from the Bradley International Airport in Connecticut, which served 5.3 million commercial passengers in 2009, to Portsmouth International Airport in Portsmouth, NH, which handled approximately 35,000 passengers in 2009.

2 U.S. Bureau of Transportation Statistics

3 The *New England Regional Airports Air Passenger Service Study* (FAA, 1995) defined the Bradley International, T.F. Green, Manchester-Boston Regional, Portland International Jetport, Bangor, Burlington, Worcester Regional and Tweed-New Haven Airports as the region's principal commercial airports, other than Logan Airport, since all of these airports either supported or had previously supported commercial jet passenger services. Subsequently, in 1999, limited commercial passenger service was introduced at Hanscom Field in Bedford, MA and at Pease International Tradeport in Portsmouth, NH (now called Portsmouth International Tradeport). These 11 airports are the focus of the New England Regional Airport Sytem Plan (NERASP) Study, which was published in 2006.

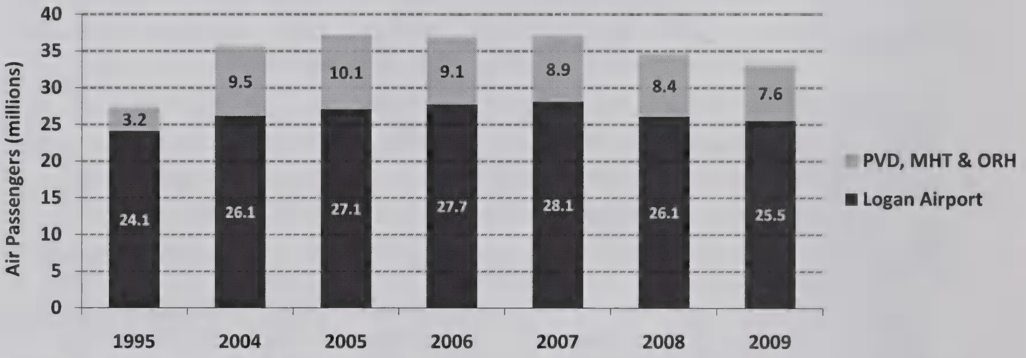
Figure 4-1 New England Regional Transportation System



Note: Airports classified by the FAA as Primary Commercial Service Airports include the categories of Large Hub, Medium Hub, Small Hub and Non-hub. Detailed definitions of each airport classification and category are found at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/. Portsmouth International Airport was formerly named Pease International Tradeport.

The regional airports that are closest to and have the greatest influence on passenger traffic and aircraft activity at Logan Airport are T.F. Green Airport in Warwick, RI, and Manchester-Boston Regional Airport in Manchester, NH. These airports are in close proximity to Logan Airport and are convenient alternatives for passengers in the Greater Boston area. Worcester Regional Airport which regained limited commercial air service at the end of 2008, would also draw some traffic from the Greater Boston market area, if it were to gain a critical mass of airline services. In 2009, T.F. Green, Manchester-Boston Regional, and Worcester Regional Airports served 22.8 percent of the combined passengers at the four Greater Boston market area airports, down from 24.4 percent in 2008. Despite the drop in air service and passengers in recent years, the regional airports continue to serve a significant share of passengers in the combined Boston/Providence/Manchester system. Figure 4-2 depicts the historic distribution of air passengers for these three regional airports and Logan Airport.

Figure 4-2 Passenger Activity Levels at Logan Airport and Surrounding Airports



Source: Massport and individual airport data reports.
Note: Grey shading represents combined passenger activity at T.F. Green Airport (PVD), Manchester-Boston Regional Airport (MHT), and Worcester Regional Airport (ORH). Black shading represents passenger activity at Logan Airport.

Regional Airport Activity Levels

The following section describes passenger activity levels and aircraft operations at the regional airports in 2009 and compares them to Logan Airport activity levels.

Passengers

In 2009, New England's 11 primary commercial airports accommodated 42 million passengers. Total air passenger traffic at the New England airports decreased significantly from the prior year, by approximately 5.4 percent (Table 4-1). The decline in air passenger traffic in the region was in line with the overall decline in the U.S. domestic market, which fell by 5.3 percent compared to 2008.[4]

The decline in regional air passengers was largely driven by reductions at the regional airports, where passenger traffic decreased by 1.8 million or 9.8 percent. Passenger traffic at Logan Airport fell by 0.6 million or 2.3 percent. The regional airports' share of New England passengers decreased slightly to 39.3 percent in 2009

4 U.S. Bureau of Transportation Statistics.

(Figure 4-3). As shown in Figure 4-3, despite the recent declines in regional airport passengers, the regional airports continued to accommodate a significant share of the region's passengers. The decline in passenger traffic at the regional airports is a reflection of the challenging operating environment facing U.S. airlines. The worsening global economic downturn in 2009 resulted in a drop in passenger demand and widespread airline capacity reductions at the regional airports. Trends at Logan Airport are discussed in detail in *Chapter 2, Activity Levels.*

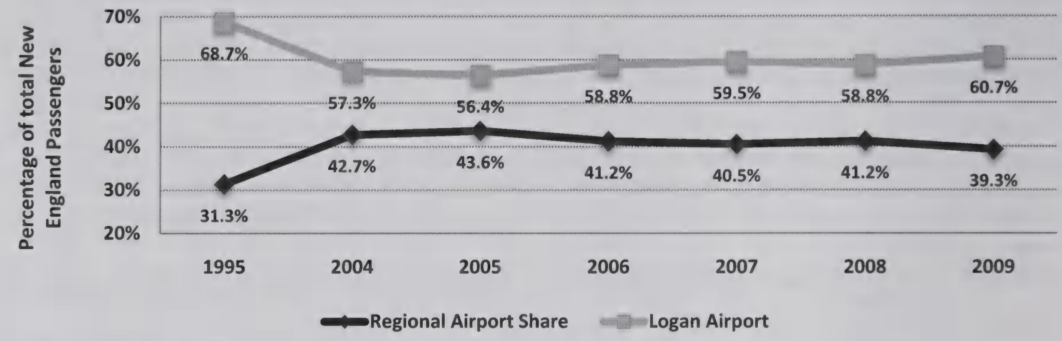
Nearly all of the regional airports experienced a drop in passenger traffic in 2009. Passenger levels fell at the largest regional airports, which include Bradley International, T.F. Green, and Manchester-Boston Regional Airports. Bangor International Airport in Maine and Worcester Regional Airport were the only airports where passenger traffic increased in 2009. Passenger traffic grew by 6.9 percent at Bangor International Airport due to an increase in Florida service by Allegiant Air. Worcester Regional Airport, which lost all commercial service in early 2007, also saw an increase in passengers due to new commercial passenger service by Direct Air. Direct Air began regularly scheduled service at Worcester in November 2008 (offering service to Punta Gorda and Sanford, Florida) and introduced additional flights to Myrtle Beach, South Carolina in March 2009. Portsmouth International Airport experienced the greatest passenger decline with a 66.7 percent decrease, as Boston-Maine Airways, the only commercial airline providing scheduled service, exited the market in 2008. Changes in scheduled services at the regional airports are discussed later in the chapter.

Table 4-1 Passenger Activity at New England Regional Airports and Logan Airport

	Passenger Levels (millions)[1]						Percent Change
Airport	2004	2005[2]	2006	2007	2008	2009	(2008-2009)
Bradley International	6.74	7.38	6.91	6.52	6.11	5.33	(12.7%)
T.F. Green	5.51	5.73	5.20	5.02	4.69	4.33	(7.7%)
Manchester-Boston Regional	3.97	4.33	3.90	3.89	3.72	3.18	(14.4%)
Portland International Jetport	1.37	1.45	1.41	1.65	1.76	1.73	(1.7%)
Burlington	1.25	1.37	1.37	1.41	1.52	1.43	(5.9%)
Bangor	0.45	0.48	0.42	0.40	0.35	0.37	6.9%
Tweed-New Haven	0.08	0.13	0.08	0.08	0.07	0.07	(2.6%)
Portsmouth International Airport[3]	0.05	0.01	0.06	0.11	0.09	0.03	(66.7%)
Hanscom Field[4]	0.02	0.02	0.02	0.02	0.00	0.00	(100%)
Worcester Regional[5]	0.00	0.00	0.03	0.00	0.00	0.04	>100.0%
Subtotal	**19.45**	**20.91**	**19.38**	**19.10**	**18.31**	**16.52**	**(9.8%)**
Logan Airport, MA	26.14	27.09	27.73	28.10	26.10	25.5	(2.3%)
Total	**45.59**	**48.00**	**47.11**	**47.20**	**44.42**	**42.02**	**(5.4%)**

Source: Massport and individual airport data reports.
Note: Data for Logan Airport includes international and connecting passengers.
1 All passengers in millions. Passenger levels are calculated by adding enplaned plus deplaned passengers (where available) or multiplying enplaned passengers by 2.
2 2005 statistics are from the New England Regional Plan Study, Fall 2006.
3 Portsmouth International Airport at Pease was formerly named Pease International Tradeport.
4 Hanscom Field served fewer than 5,000, but more than 0, commercial passengers in 2008.
5 Worcester Regional Airport served fewer than 5,000, but more than 0 commercial passengers in 2004, 2005, 2007 and 2008.

Figure 4-3 Regional Airports' Share of New England Passengers



Source: Massport and individual airport data reports.

Aircraft Operations

As shown in Table 4-2, commercial airline operations declined at all of the regional airports in 2009. An aircraft operation is defined as one take off or one landing. Total commercial operations in the New England region (including Logan Airport) dropped 9.8 percent, from over 688,500 in 2008 to approximately 621,200 in 2009. This reflects a national trend of reductions in commercial airline operations as airlines struggled to remain profitable in the face of economic recession and declining passenger demand. Smaller communities were adversely impacted in this operating environment disproportionately. In 2009, the regional airports saw a decline of 15.5 percent in commercial operations, compared to a decline of 4.2 percent at Logan Airport.

GA and military operations also declined significantly at the regional airports in 2009. GA operations at all regional airports fell by 17.9 percent, while military operations decreased by 27.1 percent. The decline in GA activity at Logan Airport was even more pronounced, with GA operations dropping by 48.6 percent in 2009. This decline is consistent with a longer-term national trend of decline for GA operations. It also reflects double-digit reductions in GA activity across the country in the past year due to sharp cuts in the use of corporate jets during the economic downturn. GA, which includes aircraft operations conducted by air taxi providers, businesses, private pilots, fractional ownership programs, law enforcement, air ambulances, student and recreational pilots, and other aviation users, is also dominated by recreational fliers who are highly sensitive to economic conditions. Hanscom Field continued to be the most active GA airport in the region.

Despite reduced recreational flying activities, GA operations continue to be the dominant type of aircraft activity at the regional airports. In 2009, GA accounted for 53.3 percent of total aircraft operations at the regional airports. By comparison, GA represented only 3.5 percent of aircraft activity at Logan Airport, which primarily accommodates the region's domestic and international commercial airline operations.[5] The share of total regional airport activity operated by commercial airlines increased slightly in 2009 to 41.7 percent compared to 40.8 percent in 2008.

Overall, the regional airports accommodated a much greater share of the region's aircraft operations than their share of air passengers due to high levels of GA traffic. While only 39.3 percent of New England's air passengers enplaned or deplaned at one of the regional airports, these airports accounted for 66.6 percent of the region's

5 There are no military operations at Logan Airport.

aircraft operations. On average, there were approximately 24.0 passengers per aircraft operation at the regional airports compared to 73.8 passengers per operation at Logan Airport. Historic aircraft operations from 2004 to 2009 are provided in *Appendix F, Regional Transportation Context.*

Table 4-2 Aircraft Operations at New England's Airports (2008-2009)

	2008				2009				
Airport	Commercial[1]	General Aviation[2]	Military & Other[2]	Total	Commercial[1]	General Aviation[2]	Military & Other[2]	Total	Share of NE Total
Bradley International	98,194	22,908	3,637	124,739	82,021	19,586	2,726	104,333	10.08%
T.F. Green	73,096	19,470	187	92,753	62,233	19,438	260	81,931	7.92%
Manchester-Boston Regional	63,505	16,198	840	80,543	54,336	14,354	1163	69,853	6.75%
Portland International	40,834	31,869	974	73,677	35,909	25,473	778	62,160	6.01%
Burlington	37,832	46,391	9,688	93,911	31,068	16,009	4,104	51,181	4.95%
Bangor[3]	19,282	27,143	20,449	66,874	16,485	19,558	16,267	52,310	5.05%
Tweed-New Haven	4,013	44,642	243	48,898	3,096	37,722	486	41,304	3.99%
Portsmouth International[4]	1,347	31,051	7,993	40,391	422	25,161	6,851	32,434	3.13%
Hanscom Field	104	164,195	1,590	165,889	0	148,696	1,215	149,911	14.48%
Worcester Regional	2,553	43,763	886	47,202	2,527	41,700	17	44,244	4.27%
Subtotal	**340,760**	**447,630**	**46,487**	**834,877**	**288,097**	**367,697**	**33,867**	**689,661**	**66.64%**
Logan	347,784	23,820	NA	371,604	333,064	12,242	NA	345,306	33.36%
Total	**688,544**	**471,450**	**46,487**	**1,206,481**	**621,161**	**379,939**	**33,867**	**1,034,967**	**100.00%**

	Percent Change (2008-2009)			
Airport	Commercial[1]	General Aviation[2]	Military & Other[2]	Total
Bradley International	(16.47%)	(14.50%)	(25.05%)	(16.36%)
T.F. Green	(14.86%)	(0.16%)	39.04%	(11.67%)
Manchester-Boston Regional	(14.44%)	(11.38%)	38.45%	(13.27%)
Portland International	(12.06%)	(20.07%)	(20.12%)	(15.63%)
Burlington	(17.88%)	(65.49%)	(57.64%)	(45.50%)
Bangor[3]	(14.51%)	(27.94%)	(20.45%)	(21.78%)
Tweed-New Haven	(22.85%)	(15.50%)	100.00%	(15.53%)
Portsmouth International[4]	(68.67%)	(18.97%)	(14.29%)	(19.70%)
Hanscom Field	(100.00%)	(9.44%)	(23.58%)	(9.63%)
Worcester Regional	(1.02%)	(4.71%)	(98.08%)	(6.27%)
Subtotal	**(15.45%)**	**(17.86%)**	**(27.15%)**	**(17.39%)**
Logan	(4.23%)	(48.61%)	-	(7.08%)
Total	**(9.79%)**	**(19.41%)**	**(27.15%)**	**(14.22%)**

Source: Massport, FAA Tower Counts, FAA Terminal Area Forecast, and individual airport records.

1 May include Air Taxi operations by fractional jet operators. FAA Tower counts include some fractional jet operations as "Air Taxi/Commuter" operations.

2 Includes itinerant and local general aviation and military operations at the regional airports. There are no military operations at Logan Airport.

3 Includes international aircraft making a technical stop at Bangor Airport.

4 Data for Portsmouth International Airport at Pease, formerly named Pease International Tradeport, provided by the Pease Development Authority.

Service Developments at the Regional Airports

Airlines can adjust service at an airport or on a specific route in two ways: one is to change the number of flights operated, and the other is to change the size of the aircraft. Changes in flight frequency and changes in aircraft size both affect the number of seats available to passengers, also known as seat capacity. Airline services are therefore typically discussed in terms of seat capacity as well as the number of flight departures.[6] This section examines changes in airline departures and seat capacity at the regional airports in 2009 and provides an overview of new and discontinued routes.

In 2009, scheduled commercial services were significantly reduced overall at the regional airports. Airlines eliminated flights or reduced frequencies on less profitable routes due to the economic downturn, also resulting in declines in seat capacity. At the regional airports, scheduled commercial operations generally declined at the same rate as available seat capacity, meaning that instead of reducing available seats on scheduled departures through substituting smaller aircraft, the number of flights was reduced. Table 4-3 shows the share of scheduled domestic departures for Logan Airport and the ten regional airports in recent years for the peak travel month of August. The regional airports accounted for 44.5 percent of the scheduled departures in the New England region in August 2009, down slightly from 46.5 percent in August 2008. Airline cutbacks were most pronounced at the medium-size airports, which include Bradley International, T.F. Green, and Manchester-Boston Regional Airports. Despite service reductions at the smaller airports also, the share of New England scheduled departures at small airports did not change in 2009.

Bradley International Aiport

Bradley International Airport in Windsor Locks, CT, experienced the sharpest service cutbacks among the medium-size airports. Overall, scheduled commercial departures declined 13.3 percent and available seat capacity declined 16.2 percent. After Delta Air Lines integrated Northwest Airlines services into its system after completing a merger, it reduced seat capacity at Bradley Airport by approximately 22 percent. The merged Delta Air Lines confirmed in 2009 that it would not re-start international non-stop service to Amsterdam from Bradley as promised by Northwest Airlines in early 2009. This was Bradley's only transatlantic service, which Northwest Airlines had begun in July 2007 and suspended indefinitely in October 2008. Delta Air Lines also terminated Bradley's only non-stop west coast service to Los Angeles in 2008, but subsequently announced that it will resume this service seasonally in 2010. During 2009, Delta Air Lines cut seat capacity on its Atlanta, Cincinnati, and Indianapolis routes from Bradley, and eliminated departures to Florida during the off-season.

T.F. Green Airport

In 2009, T.F. Green Airport in Warwick, RI, saw continued reductions in scheduled operations and available seat capacity by all airlines serving the Airport. Overall, scheduled commercial departures declined 11.5 percent and available seat capacity declined 9.7 percent compared to 2008. The most significant cutbacks were implemented by Southwest Airlines, Delta Air Lines, and US Airways. Southwest Airlines reduced frequencies on its Baltimore, Orlando, Chicago Midway, and Tampa routes. Delta Air Lines terminated New York JFK service and reduced seat capacity on its Cincinnati and Detroit routes in 2009.

6 A departure is an aircraft take off at an airport. While aircraft operations include both departures and arrivals, airline services are typically described in terms of departures, as the number of scheduled departures generally equals the number of scheduled arrivals. Changes in departures translate to changes in overall operations.

Manchester-Boston Regional Airport
Manchester-Boston Regional Airport (NH) also experienced deep declines in scheduled services in 2009. Overall, scheduled commercial departures declined 15.6 percent and available seat capacity declined 14.9 percent. Southwest Airlines reduced scheduled operations by approximately 13 percent, cutting frequencies on the Baltimore, Chicago Midway, and Orlando routes. US Airways continued to reduce services in the Charlotte, New York La Guardia, and Washington National Airports' markets in 2009.

Portland International Jetport
Portland International Jetport (ME) experienced cutbacks in service by Delta Air Lines and US Airways, but also some limited service increases, resulting in a more moderate decline than other regional airports. Overall, scheduled commercial departures declined 5.9 percent and available seat capacity declined 2.6 percent. Cutbacks in service by Delta Air Lines and US Airways at Portland International Jetport were offset by some service increases, resulting in a more moderate decline than other regional airports. Starlink Aviation began small turboprop service to Yarmouth, Nova Scotia, Canada from Portland in 2009. Continental Airlines also added available seat capacity between Portland and Newark-Liberty International Airport, replacing all regional jets with 50 or fewer seats with 74-seat turboprop service.

Burlington International Airport
Burlington International Airport (VT) experienced decreases in scheduled operations and available seat capacity. Overall, scheduled commercial departures declined 8.4 percent and available seat capacity declined 7.6 percent. United Air Lines, Delta Air Lines, and US Airways all introduced service cuts at the Airport. United Air Lines, Delta Air Lines, and US Airways all introduced service cuts at the Airport. AirTran Airways entered the Burlington market with service to Baltimore in June 2008, but discontinued the service and withdrew from Burlington Airport in August 2009.

Bangor International Airport
At Bangor International Airport (ME) scheduled commercial departures decreased 0.1 percent, while overall available seat capacity increased 1.1 percent. Continental Airlines discontinued its regional jet service to Newark in 2009, withdrawing from the Airport. Delta Air Lines also continued cutbacks in service, discontinuing Bangor to Boston flights in December 2009. However, some service increases were introduced by US Airways and Allegiant Air. Allegiant Air increased its Florida services at Bangor, adding St. Petersburg/Clearwater as a new market, while U.S. Airways increased seat capacity to New York La Guardia Airport.

Non-hub Regional Airports
The trend of airline service reductions also impacted the smallest regional airports. Scheduled commercial departures declined by 2.7 percent and available seat capacity by 2.6 percent at Tweed-New Haven Airport (CT). Portsmouth International Airport (NH) and Hanscom Field (MA) both lost all scheduled service early in 2008 and no new service was introduced in 2009. Worcester Regional Airport, which lost commercial service in 2007 when Allegiant Airlines withdrew from the Airport, received new scheduled charter service by Direct Air in November 2008. Direct Air began services to Punta Gorda and Sanford from Worcester in 2008 and added service to Myrtle Beach in 2009.

Relationship Between the Regional Airports and Logan Airport
Despite the service reductions at the regional airports in 2009, the trend of decreased reliance on connecting service through Logan Airport continued. Figure 4-4 shows that of all flights originating at one of the regional airports, the percentage of these flights with a destination of Logan Airport has been declining steadily since the mid-nineties. In 2009, regional airport service to Logan Airport represented 0.5 percent of all New England airline flights. Service at the regional airports no longer depends on connections at Logan Airport, meaning that

the regional airports, able to support more of their own non-stop services, are operating more autonomously from Logan Airport than before. The significance of this trend is that it reduces pressure on Logan Airport to provide connecting service for small planes from small communities to other destinations, allowing Logan Airport to handle more passengers more efficiently on larger aircraft.

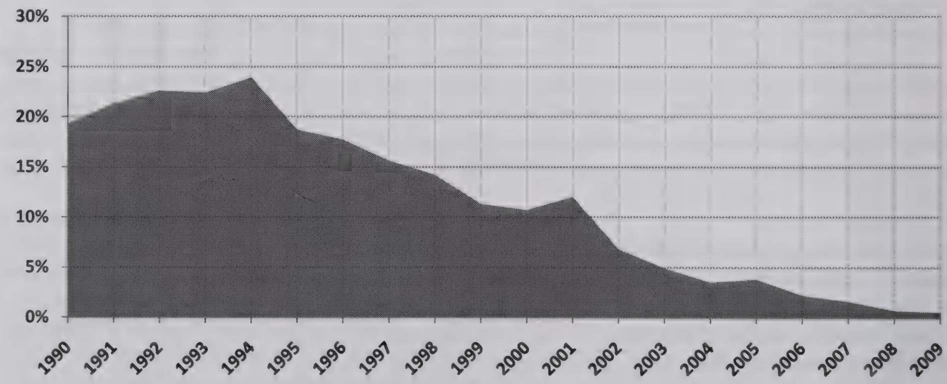
Details of scheduled passenger departures and seats by market and carrier for the regional airports are presented in *Appendix F, Regional Transportation Context*.

Table 4-3 Share of Scheduled Domestic Operations - Logan Airport and the Ten Regional Airports[1]

	2005	2006	2007	2008	2009
Logan Airport, MA	49.6%	52.8%	52.2%	53.5%	55.5%
Bradley International, CT; Manchester-Boston Regional Airport, NH; T.F. Green Airport, RI	35.1%	33.6%	33.5%	32.3%	30.3%
Bangor, ME; Portsmouth International Airport, NH; Burlington, VT; Hanscom Field, MA; Tweed-New Haven, CT; Worcester Regional, MA; Portland International Jetport, ME	15.3%	13.6%	14.3%	14.2%	14.2%

Source: The Official Airline Guide.
1 Based on scheduled domestic departures for the peak travel month of August.

Figure 4-4 Share of Flights Originating at Regional Airports with Logan Airport as Destination



Source: Official Airline Guide. (August for each year.)
Note: Includes all New England airports with scheduled airline service.

Service Developments at Massport Owned and Operated Regional Airports

The following section describes changes in service at Massport-operated airports.

Hanscom Field

Hanscom Field, which Massport owns and operates, continues to play an important and unique role in the regional and Massachusetts state transportation system, as a premiere facility for business/corporate GA and as a GA reliever for Logan Airport. Due to its location and close proximity to Boston, Hanscom Field accommodates a variety of GA operations that might otherwise use Logan Airport. In addition to its role as a GA reliever to Logan Airport, Hanscom Field has in the past accommodated niche commercial airline services. However, Hanscom Field has been without scheduled commercial service since the beginning of 2008, when Boston-Maine Airways discontinued services to Portsmouth, NH and Trenton, NJ.

In 2009, there were 149,900 aircraft operations at Hanscom Field, more than twelve times the number of GA operations than occurred at Logan Airport and the highest in the region. Total aircraft operations at Hanscom Field in 2009 were down 9.6 percent from 2008 levels. Approximately 40 percent of aircraft operations are conducted for pilot training purposes. In 2009, this type of activity declined by 8.6 percent. Recreational flying, which is conducted in single and twin engine piston-powered aircraft accounted for 34 percent of operations. This category was down by 6.5 percent in 2009 when compared to 2008 levels. Business/corporate and charter activity, which represented about 21 percent of Hanscom Field operations, fell sharply by 17.2 percent in 2009. Linear Air, an air taxi charter company, provides private air transportation from Hanscom Field to cities throughout the Northeast and eastern Canada. It offers the Eclipse-500, a very light jet that seats three passengers, and nine-seat Cessna Caravan turboprops on a charter basis. In 2009, Linear Air conducted 631 operations at Hanscom Field and accommodated 681 charter passengers.

Worcester Regional Airport

Worcester Regional Airport is recognized as an important aviation resource to the Central Massachusetts region. Starting in February 1995, Massport began collaborating with the City of Worcester, the airport owner, to identify opportunities for increasing the utilization of Worcester Regional Airport to accommodate some of the regional demand that otherwise would use Logan Airport. In 1999, Massport entered into an agreement with the City of Worcester and the Worcester Airport Commission to assume operation of the airport and eventually to assume title to the airport. In January 2000, Massport entered into the first phase of the agreement and took over operational responsibility for the airport. In 2009, Massport was engaged in active negotiations with the City of Worcester to acquire Worcester Regional Airport. In May 2010, the City of Worcester agreed to sell the airport to Massport for $17 million. The transfer took effect July 1, 2010.

Aerial view of Worcester Regional Airport

In 2009, Worcester Regional Airport accommodated 44,000 aircraft operations compared to 47,000 the prior year. GA accounted for 94 percent of aircraft activity at Worcester Airport. The airport lost all scheduled airline services in 2007. However, in November 2008,

Direct Air began offering regularly scheduled charter services between Worcester and two Florida markets, Orlando and Punta Gorda. Direct Air added twice weekly flights to Myrtle Beach in March 2009. In 2009, Direct Air performed 2,527 aircraft operations at Worcester and accommodated 43,000 passengers.

Service Developments at Other New England Airports

In addition to Logan Airport and the regional airports discussed thus far, a third tier of airports serves isolated communities or provides niche-commercial airline services in New England.

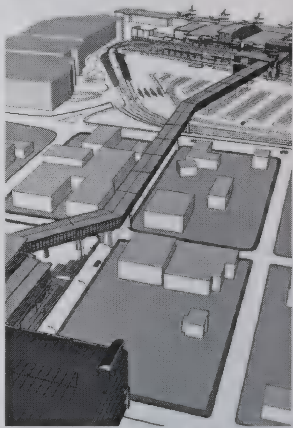
These airports include: Hyannis Airport, Martha's Vineyard Airport, Nantucket Memorial Airport, New Bedford Regional Airport, and Provincetown Municipal Airport in MA; Augusta State Airport, Bar Harbor Airport, Rockland Airport, and Northern Maine Regional Airport in ME; Lebanon Municipal Airport in NH; Block Island State Airport and Westerly State Airport in RI; and Rutland Southern Vermont Regional Airport in VT. The third-tier airports support frequent commercial service to Logan Airport and, in some instances, to T.F. Green Airport during the summer months. Most of these third-tier airports are not in close proximity to Logan Airport and are isolated due to geographic factors. Because of their geographic location and/or limited market areas, these airports are unlikely to attract passengers that now fly from Logan Airport. Instead, these airports depend on Logan Airport for connecting services.

Regional Airport Facility Improvement Plans

The following section describes significant airport facility improvements that are planned or under construction at the regional airports.

T.F. Green Airport

Rhode Island Airport Corporation (RIAC) is planning for an airport-wide program of improvements at T.F. Green Airport in Warwick, RI, comprising safety enhancements, and efficiency improvements, including extending primary Runway 5-23. The Draft Environmental Impact Statement (DEIS) for the T.F. Green Airport Improvement Program, was published in July 2010. Extending the runway will enable the airport to accommodate demand for long-range non-stop flights to the West Coast. Anticipated safety projects include resurfacing Runway 16-34 and improving the runway safety areas at its runway ends, and demolishing Hangar No. 1 due to an air space penetration. Other improvements include terminal and concourse expansion, as well as parking and roadway improvements.


Rendering of connecting bridge between Interlink and TF Green Airport

One project currently under construction in the vicinity of the airport is the RIAC and Rhode Island Department of Transportation's (RIDOT) $222 million intermodal transportation facility with a direct pedestrian connection to T.F. Green Airport. The Intermodal Facility, named Interlink, scheduled to be completed by the end of 2010, will include a commuter rail station served by Massachusetts Bay Transportation Authority (MBTA), a new consolidated rental car facility, a bus terminal for both local Providence metropolitan-area buses and intercity buses, and a parking garage. When Interlink is completed and open for train service in late 2010, T.F. Green Airport will have the closest intercity air-to-rail link in the country.

Manchester-Boston Regional Airport

Over the past decade, over $500 million was invested in Manchester-Boston Regional Airport to improve and develop landside and airside facilities and infrastructure.[7] Projects included a 158,000-square foot passenger terminal, two 75,000-square foot terminal additions, a 4,800 space parking garage with an elevated pedestrian walkway connection to the terminal, roadway improvements, and extensive runway reconstruction and lengthening. A new cell phone lot adjacent to the parking garage, providing a convenient place to wait for passengers with 30 spaces and free wifi, was also completed recently as part of an ongoing customer service enhancement program.

Manchester-Boston Regional Airport is in the process of updating its Master Plan. The long-range planning initiative will provide a "blueprint" for development and improvement of airport facilities and infrastructure during the next decade. Improvements to be completed over the next several years include:

- Reconstruction of Runway 06 and safety area improvements;
- Construction of a glycol collection/treatment facility;
- Construction of a three-gate North End Terminal Expansion; and
- Construction of Parking Lot G and expansion of Parking Lot C.

A private company Flight Line, Inc. took over the operation of the shuttle bus service serving Manchester-Boston Regional Airport after an 18-month shuttle bus pilot program proved successful. Beginning in July 2008, Flight Line provided service every 30 minutes between the airport and several points in northern Massachusetts and the Boston area. Flight Line also offers service to several Park-and-Ride facilities in New Hampshire, as well as door-to-door private or shared van service.

Bradley International Airport

A Master Plan Update at Bradley International Airport was completed in 2004. Work on the specific projects discussed in the Master Plan Update began in 2005. The refurbished and expanded Terminal A with an additional 260,000 square feet has opened; the project added a concourse, 12 new gates, and a state-of-the-art security and communications system.

A major project to reconstruct the main runway at Bradley International Airport was completed in 2009. This project, which the FAA recommends that airports perform every 20 years, involved the milling, resurfacing, grooving, and painting of the 9,500-foot by 250-foot Runway 6-24, which serves as the primary arrival and departure runway at the airport. The project also involved the upgrade of a major water main crossing and the installation of new electrical duct banks and lighting cable.

7 Airside includes all of the secured area of the airport, except for those parts within the terminal building. The airside largely encompasses the area of an airport where the aircraft take off and land, load, or unload and receive maintenance. Landside includes all area bounded by the points at which passengers and goods enter the airport by all modes and the secured portions of the airport. The airport landside includes access roads and ramps, parking facilities, the terminal curbside, and terminal facilities.

The New England Regional Airport System Plan (NERASP) Study (which is discussed later in this chapter) cited the following as other potential future capital improvements for Bradley International Airport:

- Rehabilitation of Taxiways E and T;
- Installation of Runway 33 Precision Approach Path Indicator; and
- Purchase of noise monitoring equipment and implementation of a noise abatement plan.

Hanscom Field

Massport has planned several landside and airside improvements at Hanscom Field, which are described in detail in the *Hanscom 2005 Environmental Status and Planning Report* and the annual report on *The State of Hanscom*. In Fiscal Year 2008, ending on June 30, 2009, Massport invested approximately $3.1 million in airfield, terminal and other facility improvements at Hanscom Field.

On the landside, completed projects in 2009 included the painting of the Civil Air Terminal and upgrades such as re-roofing designs for the building. Planned improvements include continued renovations to the civil terminal, with a long-term goal of supporting commuter airline operations more effectively and efficiently, as well as the redevelopment of Hangar 24 and the East Ramp. Airside improvements in 2009 included the completion of the Runway Safety Area (RSA) project and the reconstruction of the western end of Taxiways E, G, and M. Planned improvements include ongoing approach and departure surface vegetation management, and the reconstruction of Taxiway S and a portion of the west ramp. Some longer-term potential improvements include paving the perimeter surface roads and improvements in landside road areas.

Worcester Regional Airport

Worcester Regional Airport Master Plan (completed in March 2008) incorporated aviation forecasts from the FAA's NERASP Study, recommended near and long-term development actions, and identified areas to preserve for future aviation activity. Near-term projects focus on essential facility maintenance and safety and security initiatives. These projects include runway pavement and Runway Safety Areas projects and a Vegetation Management Plan (VMP). The VMP will identify tree obstructions within the airport's airspace and develop a five-year vegetation removal and maintenance plan. In addition to essential airfield infrastructure maintenance, other long-term initiatives, such as terminal enhancements, are demand-driven by the level and type of Worcester Regional Airport aviation activity realized.[8]

Upgrades at Worcester Regional Airport throughout 2009 included resurfacing/reconstruction of a portion of Runway 11-29 (with installation of Engineered Material Arresting System (EMAS)), Hangar 2 roof replacement, and replacement of runway touchdown zone lighting, centerline lighting, and airfield lighting control systems.

In 2008, the Central Massachusetts Regional Planning Commission (CMRPC) initiated a regional mobility study for Central Massachusetts. The Worcester Regional Mobility Study's overarching goal is to develop a blueprint for a series of transportation infrastructure recommendations that improve the movement of people and goods through the urban core of Central Massachusetts. The recommendations must enhance economic opportunities, improve safety, and improve connections between neighborhoods. Because the Worcester Regional Airport is one of the key economic drivers of the region, options for improving ground transportation access and wayfinding to the Airport are being considered. As an early action item, in 2009, the City, MassDOT, and

8 The Worcester Regional Airport Master Plan can be accessed via the City's website at www.ci.worcester.ma.us.

Massport staff collaborated to design and install wayfinding signs between the Airport and key regional highways. The study's recommendations are expected be finalized in late 2010.

Initiatives in Support of Regional Alternatives

In June 2009, Governor Deval Patrick signed "An Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts," which integrated Massachusetts surface transportation agencies and authorities into a new, unified and streamlined MassDOT. These agencies and authorities include the Executive Office of Transportation and Public Works (EOT), the Massachusetts Turnpike Authority (MTA), the Registry of Motor Vehicles (RMV), the Massachusetts Highway Department (MHD), the MBTA, the Regional Transit Authorities (RTA), and the Massachusetts Aeronautics Commission (MAC). As of November 1, 2009, MassDOT brought together many Commonwealth entities which plan, build, own, and maintain all modes of transportation, under a five-member board of directors. The MassDOT organization consists of four new divisions: Highway, Transit and Rail, Aeronautics, and the Registry of Motor Vehicles (RMV). Massport remains independent but is repositioned to focus on airport and seaport needs. The creation of MassDOT was intended to help integrate, coordinate, and prioritize multi-modal transportation policy and investment in Massachusetts, resulting in a more effective, efficient, equitable, rational, and innovative transportation system. As part of this legislation, ownership and control of the Tobin Bridge was transferred from Massport to MassDOT to better integrate and coordinate the transportation system under MassDOT.

As an integral part of the transportation system in Massachusetts, Massport supports a regional transportation policy to improve the efficient use of the region's transportation infrastructure by appropriate expanded use of regional airports and alternative transportation modes. To achieve this policy goal, Massport is committed to cooperative transportation planning and works actively with a broad array of transportation agencies and concerned parties to promote an integrated, multi-modal regional transportation network. Massport has undertaken a range of initiatives to advance a strong network of commercial service airports in the New England region. Ultimately, air service decisions rest with the air carriers and are driven by airline economics and business strategies.

Logan Airport is a significant trip generator for eastern New England, with thousands of people traveling to and from the Airport via different modes of transportation daily. Recognizing this, Massport participates in several interagency transportation planning forums pertaining to alternative, intercity travel modes. Previous EDRs described past initiatives and cooperative planning ventures. The following section describes Massport's initiatives.

Massport's Cooperative Planning Efforts

A balanced regional intermodal transportation network would reduce reliance on Logan Airport as the region's primary transportation hub, and provide New England travelers with a greater range of viable transportation options. Regional airports have emerged as economic and transportation centers within the communities that they serve. If this role were enhanced, this would reduce the dependence on intraregional automobile trips and on Logan Airport as the beginning, destination, or connecting point for air passengers.

As a result of the 1999 Regional Transportation Summit, Massachusetts and other New England states developed agreements to expand and improve regional transportation between the states by increasing rail services and evaluating transportation needs and impacts. In December 2000, a second annual Summit was held to discuss regional transportation issues and infrastructure development, use, and efficiency. An outcome of

this summit included the proposal to re-establish the New England Governors' Conference Committee on Transportation as a regular forum for further discussion of regional transportation initiatives.

The Council of New England Governors and other policy decision makers throughout the region have been able to utilize strategies and information developed in the NERASP Study, which provides a framework for integrated regional aviation policy and planning.

In March 2001, the New England Governors adopted a resolution to coordinate and implement regional transportation planning across the six New England states. The formal resolution created the Regional Transportation Coordinating Council (RTCC) to work with the FAA to study and increase regional airport use. The RTCC meets quarterly and consists of 12 members, with each governor appointing two members. The mission of the RTCC is to encourage federal transportation agencies to participate in the planning and funding of regional initiatives aimed at building and enhancing regional transportation infrastructure. RTCC efforts were folded into the NERASP Study.

New England Regional Aviation System Plan Study

On April 14, 2000, the FAA and the regional airport directors undertook the NERASP Study. Massport, contributing 5.0 percent of the study funds, was the contract administrator for this FAA study. The overall objective of the NERASP Study was to identify strategies for optimizing New England's regional airport system. The Study was conducted in two phases. Phase I of the Study began in 2002 and was completed in 2004. Phase II began in 2005 and the final NERASP Study report was released in October 2006.

The NERASP Study determined that airport proximity is the principal factor that passengers consider when selecting an airport if multiple airports are convenient to the passenger. However, passengers do actively choose airports that may be farther away from their ground origin or destination if those airports offer better air services, such as non-stop flights to international or transcontinental destinations, or lower airfares.

The Study identified and documented that there is a high degree of cross-airport utilization within the Greater Boston airport system: Logan, T.F. Green, and Manchester-Boston Regional Airports. In effect, the three airports act as a system of airports, with significant numbers of passengers choosing the most convenient airport in terms of access, airfares, and available air services depending on their individual air travel needs.

Regional Rail Transportation Initiatives

This section reports on recent developments and current rail service originating in Boston, the status of air-rail linkages in the Northeast Corridor, and the expanding Pilgrim Partnership which provides commuter rail between Massachusetts and Rhode Island.

Amtrak Downeaster
The Downeaster rail service operates along a 115-mile corridor between Boston-North Station and Portland, Maine. Logan Airport passengers can connect to Boston-North Station in 25 minutes via the Blue and Orange subway lines, or in about seven minutes via taxi service. The Downeaster is operated by Amtrak under contract to the Northern New England Passenger Rail Authority (NNEPRA). The Downeaster currently makes five daily round trips between Portland and Boston, with a one-way trip time of 2.5 hours. The Downeaster currently serves a total of ten passenger stations, including Boston-North Station, Anderson Transportation Center (Woburn) and Haverhill in Massachusetts; Exeter, Durham, and Dover in New Hampshire; and Wells, Saco, Old Orchard Beach (seasonal service), and Portland, Maine. Funding for the capital and operating needs of the

service is provided by the State of Maine through NNEPRA. Approximately 471,300 one-way trips were taken on the Downeaster in Fiscal Year 2009, the most since service began in 2001 and an increase of 7.0 percent over the 441,800 one-way trips taken in Fiscal Year 2008. As of June 2009, average revenue per passenger was $14. Many passengers travel on discounted monthly passes, which results in a reduced average fare.

Amtrak Northeast Corridor

Amtrak's Northeast Corridor is an intercity rail line that operates between Boston-South Station and Washington, DC via New York City. Other major destinations served by the route include Providence, RI; New Haven, CT; Philadelphia, PA; and Baltimore, MD. Logan Airport passengers can connect directly to Boston-South Station in 20 minutes via the Silver Line bus rapid transit (BRT) service, or in ten minutes via taxi. The Northeast Corridor is the mostly heavily used intercity rail corridor, and offers the highest level of service, in the U.S. Amtrak operates two distinct services between Boston and Washington, DC along the corridor: the Acela Express, its high-speed, limited-stop service that was inaugurated in the year 2000; and the Northeast Regional, a lower-speed service that makes local stops along the route. Travel times on the Acela Express range from 3.5 hours from Boston to New York to just over 6.5 hours from Boston to Washington, DC. Travel times on the Northeast Regional range from about 4 ¼ hours from Boston to New York to approximately 7 ¾ hours from Boston to Washington, DC. A total of 19 daily departures are offered from Boston-South Station to Penn Station in New York, of which about half are Acela Express. Most trips continue south to Washington, DC, and a smaller number continue further south to Newport News, Virginia. System-wide Amtrak ridership was 27.2 million one-way trips in Fiscal Year 2009. The Northeast Corridor represented 37 percent of total annual Amtrak ridership, or about 10 million passenger trips. In Fiscal Year 2009, Amtrak captured approximately 50 percent of the total air/rail market between Boston and New York, up from 18 percent before Acela service was introduced.[9]

In 2008 and 2009, 11 northeast states, including Massachusetts, with close support from Amtrak and the Coalition of Northeastern Governors (CONEG) began a coordinated, sustained effort to create a comprehensive high speed rail network throughout the Northeast. In 2009, the Secretaries of all six New England state Departments of Transportation jointly created an official New England High Speed and Intercity Rail Network plan. This plan outlines priority projects and corridors and begins a master planning process for each individual corridor.

In 2009, Amtrak initiated planning for a new Northeast Corridor Infrastructure Master Plan, which will be reported on in the *2010 EDR.*

Pilgrim Partnership

The Pilgrim Partnership is an arrangement between the MBTA and RIDOT, under which RIDOT allocates some of its federal funding to the MBTA in return for commuter rail service to Boston from RI. The MBTA Commuter Rail currently reaches Providence, and plans are in place for service to Pawtucket, Wickford, South County, and T.F. Green Airport in Warwick, RI. Commuter rail service could potentially attract more passengers from the Boston area to T.F. Green Airport. Service to Warwick and Wickford, RI, is expected to commence in late 2010.

9 Todd Stennis, Director of Governmental Affairs - Amtrak.

Other Cooperative Regional Transportation Planning and Operation Efforts

Massport participates in the following regional transportation planning efforts:

- Massport voluntarily participates in an interagency Transportation Sustainability Committee organized by MassDOT. The Sustainability Committee is the initiator of the GreenDOT Initiative. It meets regularly and shares sustainability best practices among transportation agencies. GreenDOT is a comprehensive sustainability initiative with three primary goals: reduce greenhouse gas emissions; promote the healthy transportation options of walking, bicycling, and public transit; and support smart growth development.[10]
- Massport supports the Massachusetts Healthy Transportation Compact. This initiative is a component of the Massachusetts Transportation Reform Law which reorganized transportation agencies into MassDOT. This inter-agency initiative brings together the state departments of Health and Human Services, Energy and Environmental Affairs, the Commissioner of Public Health, the MassDOT Highway Division and the MassDOT Transit Division with the intention of facilitating transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities. Massport is a voluntary participant. Actions include facilitating better accommodations for those with mobility limitations, increasing opportunities for physical activities, increasing bicycle and pedestrian travel through additional, safer and better connected bicycle and pedestrian infrastructure, a statewide complete streets policy, implementing a health impact analyses for transportation decisions, and the federal Safe Routes to School program.
- Massport supports smart multi-modal transportation planning and improving integration with its facilities through its permanent voting membership in the Boston Metropolitan Planning Organization (MPO), and ex-officio membership in the Metropolitan Area Planning Council (MAPC). MPOs are established in metropolitan areas with more than 50,000 residents and are responsible for conducting the federally required metropolitan transportation planning process. Based on this planning, they decide which surface transportation system improvements will receive federal capital transportation funds. The Boston MPO´s mission is to establish a vision and goals for transportation in the region and then develop, evaluate, and implement strategies for achieving them. MAPC is a regional planning agency serving the people who live and work in Metropolitan Boston. Its mission is to promote smart growth and regional collaboration, which includes protecting the environment, supporting economic development, encouraging sustainable land use, improving transportation, ensuring public safety, advancing equity and opportunity among people of all backgrounds, and fostering collaboration among municipalities.
- Massport periodically participates in meetings of other regional and state aviation organizations, such as the Aeronautics Division of MassDOT. The Aeronautics Division is conducting a Statewide Airport System Plan for all airports within the Commonwealth of Massachusetts under its jurisdiction. Massport is providing industry input as part of the Project Management Team reviewing the technical approach and analysis and providing strategic direction. Massport will also by participating in MassDOT's Aviation Division's economic impact report study to begin fall of 2010.

Massport also cooperates with other transportation agencies to promote transit operations. Information on Massport's cooperation with other transportation agencies regarding transportation planning and operations is provided in *Chapter 5, Ground Transportation*. Chapter 5 also provides information on transit ridership, and the status of ground transportation improvements at, and in the vicinity of, Logan Airport.

10 GreenDOT Policy Directive issued June 2, 2010: http://www.massdot.state.ma.us/main/Documents/HealthyTransportationCompact/P-10-002.pdf.

5 Ground Transportation

Introduction

The Massachusetts Port Authority (Massport) is committed to a long-term goal to promote and support public and private high-occupancy vehicles (HOVs) services aimed at serving air passengers, Airport users and employees. The goal of Massport is to attain a 35.2 percent HOV ground-access mode share at the 37.5 million air passenger annual level. Massport accomplishes this by promoting ridership on HOVs and maintaining and enhancing efficient transportation access and parking options in and around Logan Airport in order to reduce the reliance on single-occupant vehicles (SOVs). Since the early 1980s, Massport has been a leader in developing, promoting, and providing alternative means of ground transportation for access to and from Logan Airport. The diverse range of environmentally responsible alternatives to accessing the Airport by automobile for air travelers, employees and other Airport users, has diminished reliance on SOVs, thus reducing traffic congestion and improving air quality.

This chapter describes existing ground transportation options, ridership levels, parking, and traffic conditions at Logan Airport during 2009, including:

- Ground access modes, services, and ridership;
- Traffic volumes and vehicle miles traveled (VMT) calculations;
- Parking supply, demand, and rates;
- Ground access planning and management; and
- Transportation demand management measures implemented by the Logan Employee Transportation Management Association (Logan TMA).

A historical comparison of ridership levels is provided from 2004 (since the most recent Environmental Status and Planning Report (ESPR) through 2009. A complete list, dating to 1990, is provided in *Appendix G, Ground Transportation.*

Figure 5-1 presents the roadway infrastructure at Logan Airport in 2009. No changes to the roadway system were made in 2009.

Figure 5-1 Logan International Airport Roadway Network

Key Findings

Ground transportation and access highlights for 2009 include:

- Ground transportation activity levels decreased from 2008 to 2009 as a result of a 2.3 percent decline in the number of annual air passengers, as described in *Chapter 2, Activity Levels.*
- Average daily traffic on airport roadways decreased by 7 percent from 2008 to 2009, while VMT decreased by 5 percent.
- The number of vehicles parked on-Airport increased by 11 percent in 2009 compared to 2008 as Massport continued to comply with the Logan Airport Parking Freeze.
- Massachusetts Bay Transportation Authority (MBTA) transit ridership to the Airport, including the Blue Line and the Silver Line, increased in during 2009 (Table 5-1).
- Silver Line boardings at the Airport continued to grow, increasing by 11 percent in 2009 (compared to a 5 percent increase in 2008).
- In contrast, air passenger ridership on Logan Express bus, by water transportation, and by limousine decreased in 2009. From 2008 to 2009, Logan Express air passenger ridership decreased by 8 percent, ridership on water transportation decreased by 8 percent, limousine ridership decreased by 11 percent, and taxi dispatches decreased 7 percent.
- Over the past several years, transit services, including Logan Express, have experienced substantial increases in employee use. In 2009, employee use of Logan Express increased 4 percent over 2008 levels.
- The Logan Transportation Management Association (Logan TMA) continued the Sunrise Shuttle, which provides shuttle services between 3:00 AM and 6:00 AM for Airport employees who reside in East Boston.
- Massport is constructing parking improvements in the North Cargo Area (NCA) by consolidating existing temporary parking at various on-airport locations into one structured interim parking facility. The project maintains capacity in compliance with and within the limits imposed by the Logan Airport Parking Freeze. Expected completion for this parking structure is the end of 2010.

2009 Ground Access Services: Ridership and Trends

Passengers and employees access Logan Airport using many HOV/shared-ride transportation modes, including:

- Public transit (Blue Line rapid transit, Silver Line bus rapid transit, bus, and water transportation);
- Logan Express scheduled bus service;
- Scheduled buses and vans; and
- Unscheduled private limousines and vans.

Informational signage located at each terminal describing all ground transportation options available.

Additional ground access to Logan Airport is provided by modes categorized as non-HOV including private automobile, taxi, and rental car. The following sections provide an overview of transportation services available to Logan Airport users and reports on 2009 ridership levels and historic trends. Figure 5-2 shows the public transportation access options for travel to and from Logan Airport.

Figure 5-2 Logan Airport - Public Transportation Options

Massport is committed to a long-term goal to promote and support public and private HOV services aimed at serving air passengers, Airport users and employees. The goal of the Authority is to attain a 35.2 percent HOV ground-access mode share when annual air passenger levels reach 37.5 million. While private automobiles, taxis, and rental cars often carry multiple occupants, they are not categorized as HOV modes.

Annual ridership levels for HOV/shared-ride transportation modes serving Logan Airport are summarized in Table 5-1. The total number of air passengers at Logan Airport decreased by 2.3 percent from 2008 to 2009.

Table 5-1 Annual Ground-Access Transportation Activity Levels at Logan Airport

	MBTA		Logan Express Bus			Scheduled and Unscheduled HOV			
Year	Blue Line[1]	Silver Line[2]	Air Passengers	Employees	Total	Water Transportation[3]	Shared-Ride Van/Buses[4]	Limousines[5]	Taxi Pool Dispatches
2004	1,375,632	NS	857,530	408,297	1,265,827	112,493	761,320	1,448,581	1,710,000
2005	NA	254,608	837,530	397,660	1,235,190	50,000	701,500	1,250,180	1,769,880
2006	NA	642,177	891,918	418,051	1,309,969	115,113	775,640	1,591,361	1,864,238
2007	1,406,834	677,212	797,530	404,222	1,201,752	101,008	NA	1,448,060	1,925,817
2008	2,212,111	709,905	688,673	432,761	1,121,434	96,633	NA	1,385,317	1,749,730
2009	2,329,370	789,324	636,847	448,601	1,085,448	88,595	NA	1,227,096	1,630,333
% Change (2008-2009)	5%	11%	(8%)	4%	(3%)	(8%)		(11%)	(8%)

NA Not available.
NS Not in service.
1 Airport Station fare gate entrances only. January 2007: Automatic Fare Collection introduced. June 2007: Bremen Street Park entrance to MBTA Airport Station opens.
2 Boardings at Logan Airport. Service began June 1, 2005; ridership for 2005 is for the seven-month period only.
3 Includes City Water Taxi, Rowes Wharf Water Transport, Boston Harbor Water Taxi, and MBTA Harbor Express.
In 2005, available water transportation services decreased from four companies to two. Also in 2005, the final CA/T connections to the Ted Williams Tunnel were completed and opened to traffic.
4 Includes outbound passengers only on services offered by bus or van lines and hotels on a pre-determined schedule and route. Recent figures are not available.
5 Limousines include outbound passengers only, based on limo dispatches and established average vehicle occupancy. The figure for 2008 was revised.

Determination of Logan Airport's mode share (the percent of air passengers using a particular mode to access Logan Airport) is based on the results of periodic air passenger surveys.[1] The *2007 Logan Airport Air Passenger Ground-Access Survey*[2] revealed a 27.8 percent HOV mode share serving 28.1 million air passengers. The most recent Air Passenger Survey was conducted in spring of 2010, and will be reported on in the *2010 Environmental Data Report (EDR)*.

1 While the ridership information presented in this EDR provides a status report on 2009 conditions, it cannot be used to determine mode shares for individual modes or for passengers or employees separately because the data do not discern between air passengers or employees. Moreover, non-Airport patrons, such as East Boston residents and car rental patrons can be included in the ridership data.
2 To better understand the ground-access travel characteristics of air passengers to and from Logan Airport and to track historical trends of these characteristics, Massport administers a periodic (typically every three years) extensive survey of air passengers. The ground-access survey is the principal means of measuring air passenger HOV mode share.

Silver Line stop at Terminal C.

Blue Line train arriving at Airport Station.

Rapid Transit

The MBTA provides direct connections to Logan Airport via the Blue Line at Airport Station and via the Silver Line to each of the terminals. Ridership on the Blue and Silver Lines is discussed in more detail below. These modes are used by about 7 percent of Logan Airport's air passengers, based on the 2007 survey.

Blue Line Ridership

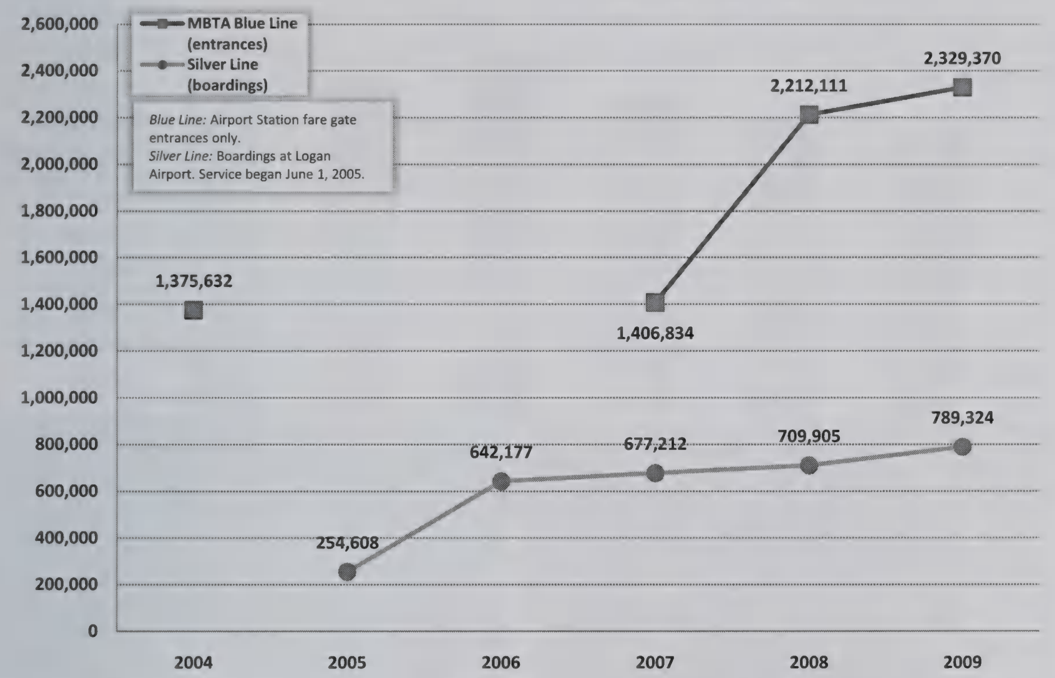
Airport Station fare gate data indicate that 2.33 million riders entered the subway train station in 2009 (compared to 2.2 million riders in 2008). The opening of the Bremen Street Park entrance to the station in 2007 increased ridership at Airport Station by serving a greater proportion of East Boston neighborhood users rather than simply serving Logan Airport customers. Since the fare data do not distinguish between Airport-related riders and East Boston users, airport passenger ridership levels on the Blue Line can no longer be directly identified as part of the EDR reporting. However, based on curbside observations approximately 45 percent of Airport Station entrances are by airport users (air passengers, employees, and others).

Silver Line Ridership

The Silver Line is a rapid bus transit service to Logan Airport provides a direct connection between the Red Line and Commuter Rail transit services at South Station and the Airport terminals via the South Boston Transitway and the Ted Williams Tunnel. The Silver Line is the only MBTA rapid transit service that provides a one-seat connection to each terminal; the Blue Line requires a second-seat ride on a free Massport shuttle to connect riders to terminals.

As shown in Table 5-1 and in Figure 5-3, Silver Line ridership to/from the Airport continues to increase. Ridership has increased every year since inception of the service in June 2005. The 2007 Air Passenger Survey data indicated that a portion of Silver Line ridership reflects passenger diversion from the Blue Line, and that many riders were former taxi users to the Airport.

Figure 5-3 Annual MBTA Ridership (Boardings) at Logan Airport



Note: Blue Line ridership data was not available for 2005 and 2006; in 2007, new equipment was installed to allow for more reliable ridership data collection.

Logan Express Bus Service
Massport provides frequent express bus service to Logan Airport for air passengers and Logan Airport employees from park-and-ride lots in Braintree, Framingham, Woburn, and Peabody. Full service bus terminals and secure parking are provided at all four locations. The round-trip adult fare is $22; reduced fares are offered to seniors, and children under the age of 12 ride free with an adult. Parking rates are $11 per day or up to $66 per week.

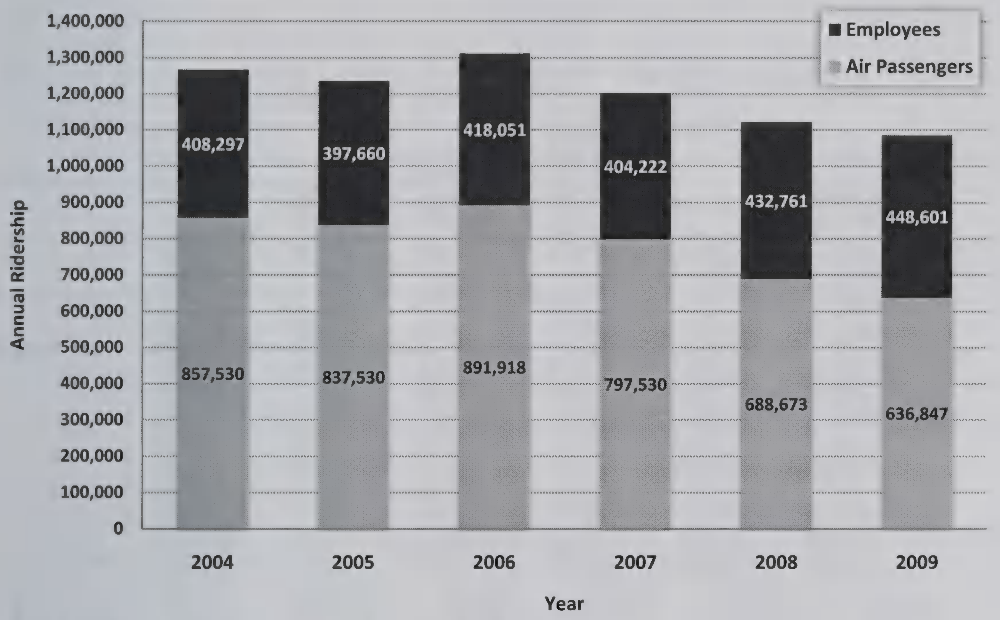
On weekdays and Sundays, scheduled half-hour headways are provided between the Braintree, Woburn, and Framingham locations and Logan Airport; one-hour headways are provided at these locations on Saturdays. In September 2009, the scheduled bus service to/from Peabody changed in response to low ridership and is now provided hourly on weekdays and every 1½ hours on weekend days.

Recent annual ridership trends for Logan Express are shown on Figure 5-4 and Table 5-1. Air passenger ridership on Logan Express decreased 8 percent, while employee ridership increased 4 percent from 2008 to 2009. A detailed breakdown of the Logan Express ridership is presented in *Appendix G, Ground Transportation.* Logan Express is used by about 4 percent of Logan Airport's air passengers, according to the 2007 Air Passenger Survey.

A Framingham Logan Express bus waiting at the curbside arrivals level.

Designated waiting area at the curbside arrivals level of Terminal E for both Logan Express buses serving Framingham, Peabody, Woburn and Braintree, and also other scheduled buses serving much of New England.

Figure 5-4 Logan Express Bus Annual Ridership



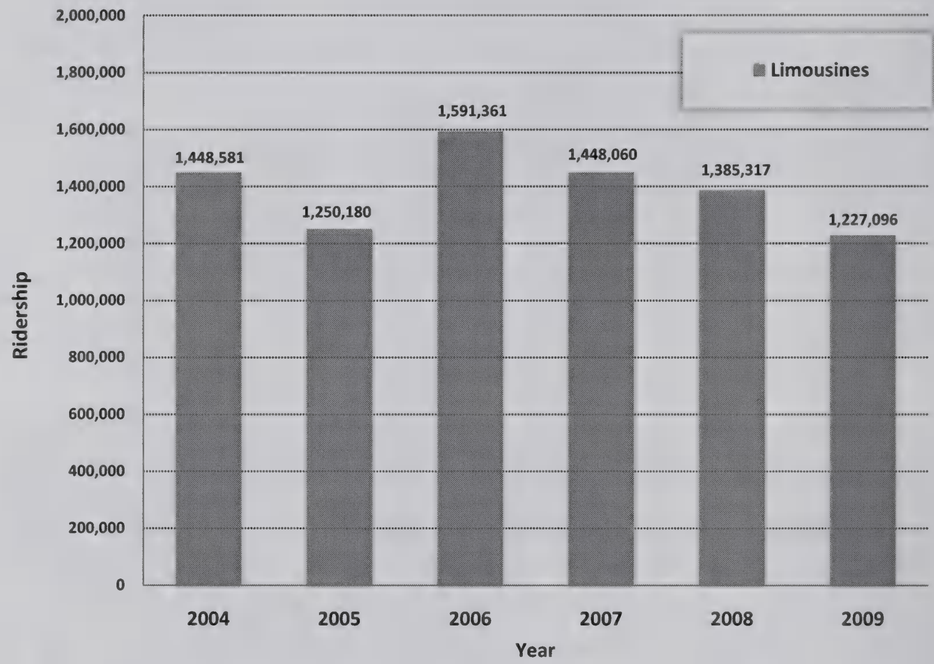
Scheduled Buses, Shared-Ride Vans, and Limousines

Massport provides designated curb areas at all airport terminals to support the use of privately-operated shared-ride vans, buses, and limousine services. About 15 percent of air passengers use these shared-ride/HOV services to arrive at Logan Airport, based on the 2007 Air Passenger Survey.

The majority of scheduled HOV/shared-ride carriers use a combination of 15- to 40-passenger vehicles and over 40-passenger coach buses. Scheduled express bus service is offered by several privately-operated carriers from outlying areas of the Boston metropolitan area and neighboring states. Shared-ride van services include services between Logan Airport and many hotels in the Greater Boston area. Shared-ride vans also provide service from western Massachusetts and other regional points throughout New England.

Massport offers a 50 percent discount on the ground access fees for alternative fuel vehicles (AFV) that use compressed natural gas (CNG) or are powered by electricity. As shown in Table 5-1 and Figure 5-5, the use of limousines continued to decrease (by about 11 percent) in 2009.

Figure 5-5 Limousine Annual Ridership/Activity[1]



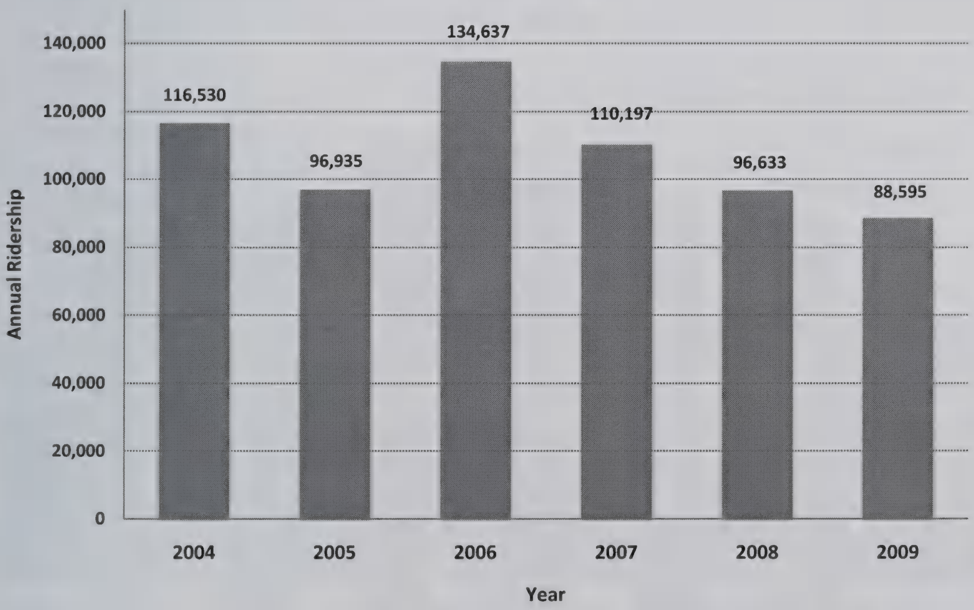
1 Limousines include outbound passengers only, based on limo dispatches and an established average vehicle occupancy.

Water Transportation

Four companies provide water transportation within the Boston area: City Water Taxi, Rowes Wharf Water Shuttle, Boston Harbor Water Taxi, and MBTA Harbor Express. At the Airport, these companies stop at the Logan Airport dock on Harborside Drive. Collectively, these companies serve numerous destinations throughout Boston Inner Harbor. The water taxi landings include Long, Rowes, and Central wharfs; the World Trade Center and the Moakley Courthouse in South Boston; Lovejoy Wharf near North Station; and stops in the North End, Charlestown, Chelsea, and East Boston. The Harbor Express provides services to destinations outside of the Inner Harbor, including Quincy and Hingham. Massport provides courtesy, CNG-powered bus shuttle service between the Logan Airport dock and all Airport terminals.

Annual ridership on water transportation experienced an 8 percent decline in 2009 compared to a 12 percent decline in 2008, as shown in Figure 5-6. Water transportation accounts for less than 1 percent of the mode share to Logan Airport, according to the 2007 Air Passenger Survey.

Figure 5-6 Water Transportation Annual Ridership



Note: In 2005, available water transportation services decreased from four companies to two.

Automobile Access

Logan Airport patrons can access the Airport by a number of automobile modes, including:

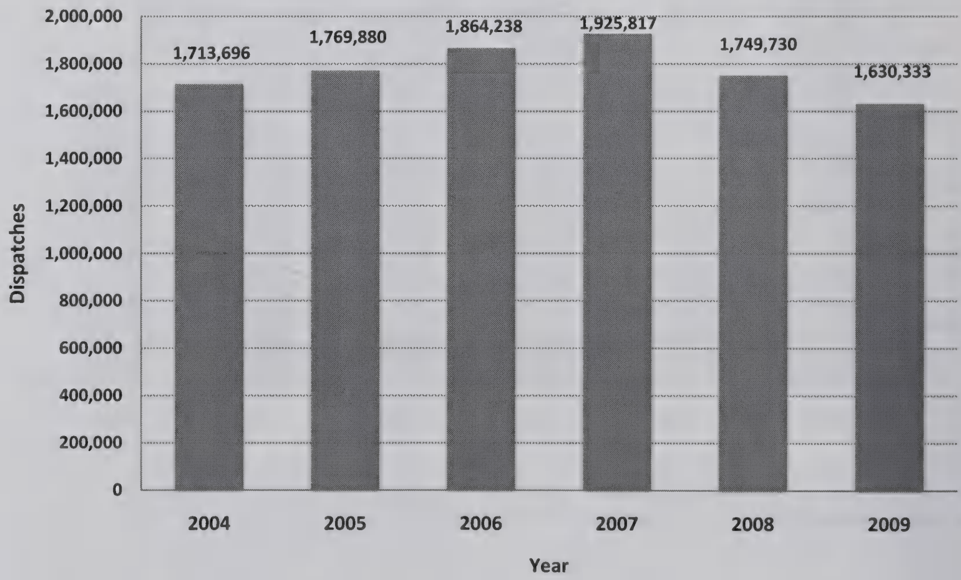
- Curbside drop-off (and pick-up) by private automobile;
- Driving to Logan Airport and parking at a terminal area garage/lot or Economy/remote lot;
- Taxis; and
- Rental cars.

These modes account for about 73 percent of the access mode used by air passengers, based on the 2007 survey. Although these modes are categorized as non-HOV, they frequently carry more than one passenger per vehicle. Based on the 2007 Air Passenger Survey results, average vehicle occupancy is estimated at 2.3 for these modes.

Taxis

Taxi ridership trends are reflected in the total number of taxis dispatched from Logan Airport (serving outbound passengers). As shown in Table 5-1 and Figure 5-7, the total number of taxis dispatched continued to decline in 2009. Taxi use by Logan Airport passengers remains well below the highest recorded levels (2.14 million dispatches in 2000). The 2007 Air Passenger Survey found that taxis had a mode share of approximately 21 percent.

Figure 5-7 Annual Taxi Dispatches



Note: The available taxi data only reports dispatches from Logan Airport's taxi pool. The data do not include suburban or city taxis that drop passengers at Logan Airport and depart empty, as these companies are not required to provide their ridership statistics to Massport.

Rental Car

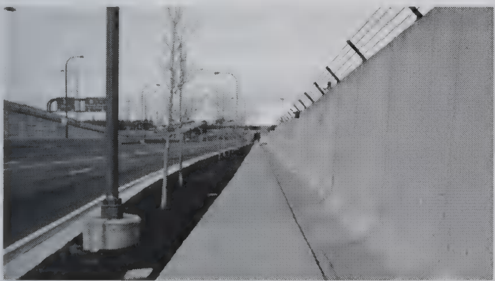
Currently, eight rental car agencies serve Logan Airport. Seven companies (Hertz, Avis, Budget, Enterprise, Alamo, Dollar, and National) are located on-airport in the Southwest Service Area (SWSA). One rental car agency (Thrifty) operates from a site on Route 1A north of the Airport; Thrifty is expected to relocate onto the Airport with the proposed consolidated car rental facility (ConRAC) in the SWSA. Each rental car agency operates its own diesel-fueled shuttle bus fleet that runs between all terminals and their respective on or off-airport facilities. The SWSA Redevelopment project will consolidate the bus fleet into a single diesel-electric hybrid and CNG fleet serving all terminals.

The 2007 Air Passenger Survey showed that the percentage of air passengers using rental cars (ground-access mode share for rental cars) was about 12 percent.

Logan Employee Transportation

Massport strives to reduce the number of Airport employees commuting by private automobile, to enhance commuter options, and to reduce traffic and parking demands at Logan Airport. To help accomplish these objectives Massport continues to:

- Provide off-airport employee parking in Chelsea, which is served by frequent shuttle bus service to the terminals;
- Run free employee shuttle buses between Airport Station and employment areas in the Southwest and South Cargo service area;
- Operate early morning Logan Express bus trips for early commuters; and
- Support the Logan TMA.
- Maintain a comprehensive sidewalk system on Logan Airport to facilitate employee and pedestrian access.



Unique among large U.S. airports, Logan Airport has a comprehensive sidewalk system connecting each terminal, the surrounding neighborhoods, and most buildings at the Airport.

Logan Transportation Management Association

Massport established the Logan TMA in 1997 with the following goals:

- Reduce Airport employee parking needs, traffic congestion, air pollution, and commuting costs by organizing/supporting alternatives to drive-alone commuting.
- Enhance public and private transportation services to Logan Airport through advocacy/support for expanded HOV services and discount fares for Airport employees.
- Provide a forum for Logan Airport tenants and employees to address common transportation concerns, and to work with government entities to create coordinated transportation management programs.

The Massachusetts Department of Transportation's (MassDOT) Office of Transportation Planning, through its Mass*RIDES* program, provides the Logan TMA coordinator role. Mass*RIDES*'s administrative support for the Logan TMA allows Massport to use its financial resources to support Transportation Demand Management (TDM) services: Massport contributes $65,000 annually to the Logan TMA. Also, Massport provides space and equipment for the Logan TMA office (a.k.a., the Transportation Store) in Terminal C.

The Logan TMA advises employers on transit benefits and provides information on available commuting transportation alternatives, ride-matching services, and reduced-rate HOV/transit fare options. It actively works with airlines, rental car companies, cargo transport companies, and other tenants at Logan Airport to encourage and offer commuting incentives to employees. Several companies offer a subsidy to employees using public transit or Logan Express to travel to work at the Airport.

The TMA is open to all companies and their employees at Logan Airport. Fourteen companies (including Massport) were members of the TMA in 2009, with a total of over 2,700 employees at Logan Airport represented by these organizations. Individuals may also belong to the TMA and benefit from its services.

Table 5-2 Logan TMA Membership (Employees of Member Companies)

Year	Number of Employees
2004	5,200
2005	2,874
2006	1,009
2007	2,641
2008	3,237
2009	2,746

Source: Logan Employee Transportation Management Association (Logan TMA) and Massport.

Benefits and services provided by the Logan TMA to its members in 2009 included:

- East Boston early morning shuttle service (Sunrise Shuttle), which was launched in August 2007, continued operations. This shuttle service provides low-cost efficient transportation to Airport employees who live in East Boston. The shuttle service operates outside of MBTA service hours between 3:00 AM and 6:00 AM, with half hourly shuttles transporting employees between various East Boston locations and the Airport terminals. Ridership levels have steadily increased since the shuttle's launch and have reached 425 riders per month.
- Computerized ride-matching services for participating in carpools and vanpools.
- Individualized commuter mobility programs for member organizations that present the best actions a company can take to reduce its own employees' dependence on the automobile.
- Airport-wide and individual employer events, such as Transportation Awareness Day, to disseminate information about Logan TMA services.
- Advocacy for improved service and reduced fares for its members from Massport, the MBTA, or other providers of mass transit and other alternative forms of transportation.
- Commuter advisories, which alert employees via email to scheduled lane closures and other activities or events that may affect airport access.

Ground Access Traffic Conditions

This section presents ground access traffic conditions at Logan Airport in 2009, including gateway traffic volume and VMT estimates for Logan Airport's roadway system. Gateways are defined as access points to/from Logan Airport, which include the Route 1A roadway ramps, Ted Williams Tunnel (Interstate 90) ramps, Neptune Road/Frankfort Street, and Maverick Street.

Gateway Traffic Volumes

Table 5-3 summarizes the daily gateway traffic volumes at Logan Airport for the years 2004 through 2009. It includes average annual daily traffic (AADT), average annual weekday daily traffic (AWDT), average weekend daily traffic (AWEDT), and annual air passengers. The opening of the permanent Route 1A connections to the Ted Williams Tunnel (2004) established the benchmark of new ground travel patterns through the newly "modernized" Logan Airport. Thus, VMT comparisons to prior years may not be accurate. Historical data are provided in *Appendix G, Ground Transportation* for informational purposes.

Table 5-3 Logan Airport - Gateway Airport-Related Annual Average Daily Traffic

	AADT		AWDT		AWEDT		Annual Air Passengers	
Year	Volume	Percent Change	Volume	Percent Change	Volume	Percent Change	Level of Activity	Percent Change
2004	100,206	12.6%	106,278	13.4%	84,950	10.0%	26,142,516	14.7%
2005	106,000	5.8%	112,600	6.0%	89,400	5.2%	27,087,905	3.6%
2006	NA	NA	NA	NA	NA	NA	27,725,443	2.4%
2007	110,690	4.4%	119,200	5.9%	91,320	2.1%	28,102,455	3.7%
2008	96,187	(13.1)%	100,107	(16.0)%	80,797	(11.5)%	26,102,651	(7.1)%
2009	**89,575**	**(6.9)%**	**93,670**	**(6.4)%**	**78,905**	**(2.3)%**	**25,512,086**	**(2.3)%**

AADT Average annual daily traffic.
AWDT Average annual weekday daily traffic.
AWEDT Average weekend daily traffic.
NA Information Not Available. Gateway traffic volumes were not collected in 2006 due to the temporary closure of the Ted Williams Tunnel.

Average annual daily traffic entering and departing the Airport decreased by 6.9 percent between 2008 and 2009. This decrease in traffic volume can be attributed to:

- A 2.3 percent decrease in air passenger activity in 2009;
- An 8.0 percent decrease in taxi cab dispatches;
- An 11 percent decrease in limousine dispatches, and
- An increase in transit ridership.

In 2009, the air passenger activity level decreased to 25.5 million annual passengers, compared to 26.1 million in 2008. Historically, this volume of air passengers is equivalent to the passenger activity in 1997. The traffic volumes are also similar during both years, suggesting no significant changes in vehicle traffic utilizing the airport roadway system over the past decade. Despite this trend, 2009 VMT (discussed below) is well below 1997 VMT estimates, highlighting the success of the Logan Airport Modernization project in reducing on airport roadway trip lengths by improving circulation roadways.

In May 2008, a card-access controlled gate was installed at the Maverick Street gateway. The purpose of the card-access controlled gated is to limit commercial vehicle traffic in the Jeffries Point neighborhood. Access through this gate is exclusively for East Boston residents. This is reflected in the analysis of Gateway volume and VMT.

Vehicle Miles Traveled

VMT on Logan Airport for each year are calculated using a model that was developed for the Logan Airport roadway system in 1994. Since then, the roadway network in the model has been adjusted on an annual basis to account for various changes of the airport roadway network over time. There were no changes to the roadway network in 2009. Modeled gateway traffic volumes have also been recorded annually to capture changes in traffic volumes at the airport gateways and changes from the roadway system.

As part of the 2004 airport modernization project, an extensive traffic count program was conducted to provide demand and distributional characteristics of traffic on the airport roadway system. Counts were taken at gateways and internal roadways and used to calibrate the distribution component of the model to reflect traffic conditions on the airport roadway system. When compared to 2004, 2009 distributional characteristics on the airport roadway system have not changed significantly, with the exception of the re-opening of Terminal A, the opening of the MBTA service roadways, and the adjustment for the ramp serving Terminal E. The 2004 baseline was been updated to reflect these changes.

Consistent with previous years, the following specific time periods were analyzed for 2009:

- Morning peak hour (AM Peak Hour);
- Evening peak hour (PM Peak Hour);
- Highest consecutive 8-hours (High 8-Hour); and
- Average AWDT.

The AWDT analysis provides an indication of the overall effects of changes in traffic flow during an average weekday. The High 8-Hour VMT was calculated by applying a ratio of 0.48 to daily traffic for each of the roadway link. This ratio, or K-factor (the percentage of daily traffic occurring during the highest 8 consecutive hours), is the same factor used in previous Logan Airport environmental filings. The AM and PM peak hour traffic volumes are based on the ratios of peak hour volumes to daily volumes obtained from previous model projections.

Table 5-4 summarizes the VMT estimates for Logan Airport-related traffic from 2004 through 2009. Historical data, back to 1990, are provided in *Appendix G, Ground Transportation*. The AWDT VMT for airport-related traffic decreased by 5.2 percent in 2009, which can be attributed directly to a decrease in annual passengers at the Airport. Past reductions in VMT were also attributed to improved roadway connections, which is not the case in 2009.

The 5.2 percent decrease in VMT is slightly lower than the 6.4 percent decrease in airport-related AWDT volumes. This is due, in part, to the change in the distribution of traffic volumes at the gateways. The traffic volume data show a significant shift, approximately 30 percent, in traffic volume at the Route 1A gateways. Traffic entering at the Route 1A gateway from points north decreased by 28.5 percent, while the traffic entering from Route 1A/Callahan Tunnel to the south has increased by 30.8 percent. The change in the distribution increased the travel distance on the airport roadway for vehicles to reach their destinations; thereby increasing VMT for those trips. Details of the 2009 VMT estimates are presented in *Appendix G, Ground Transportation*.

Table 5-4 Airport Study Area Vehicle Miles Traveled (VMT) for Airport-Related Traffic					
Analysis Year	AM Peak Hour	PM Peak Hour	High 8-Hour	Average Weekday	Average Weekday Percent Change
2004	8,292	10,563	77,029	160,477	3.5%
2005	8,477	10,998	80,240	167,166	4.2%
2006	NA	NA	NA	NA	NA
2007	9,594	12,304	88,614	184,613	10.4%
2008	8,533	10,941	78,663	163,882	(11.2%)
2009	**8,098**	**10,379**	**74,612**	**155,442**	**(5.2%)**

NA Information Not Available

2009 Parking Conditions

Massport manages its parking supply at Logan Airport to promote long-term rather than short-term parking; support efficient utilization of parking facilities; and comply with the provisions of the Logan Airport Parking Freeze. Details are presented in the following sections.

Parking Freeze

The number of commercial parking spaces allowed at Logan Airport is regulated by the Logan Airport Parking Freeze (310 Code of Massachusetts Regulations 7.30), which is an element of the Massachusetts State Implementation Plan (SIP) under the Federal Clean Air Act. As required, Massport submits semi-annual filings to the Massachusetts Department of Environmental Protection (MassDEP) demonstrating Massport's compliance with the Logan Parking Freeze. The two reports for 2009 are provided in *Appendix G, Ground Transportation*.

Table 5-5 presents the total number of parking spaces permitted on-Airport and Massport's allocation of these spaces between commercial and employee spaces. The Logan Parking Freeze distinguishes between commercial and employee parking. Additional detail on Logan Airport's parking supply is presented in *Appendix G, Ground Transportation*.

Table 5-5 Logan Airport Parking Freeze: Allocation of Parking Spaces			
	Type of Spaces		
Year	On-Airport Commercial Spaces	On-Airport Employee Spaces	Total Logan Airport Spaces Permitted
1992 - 1994	12,215	7,100	19,315
1995 - 1997	12,890	6,425	19,315
1998 - 2000	14,090	5,225	19,315
2001 - 2006	15,467	5,225	20,692[1]
2007 - 2009	17,319	3,373	20,692

Source: Massport.

1 In 2000, the Massachusetts Department of Environmental Protection (MassDEP) approved an amendment to the Logan Airport Parking Freeze to accommodate the transfer of 1,377 spaces originally located in the East Boston Parking Freeze Area to the Logan Airport Parking Freeze Area.

Parking Consolidation in the North Cargo Area

As described in *Chapter 3, Airport Planning*, in 2010, Massport began construction of the Logan Airport Parking Deck Project, an additional two-level parking deck above the existing surface parking lot on the Robie parcel within the NCA. The parking decks will not increase the number of commercial parking spaces at Logan Airport, but will consolidate to one central location the capacity at various existing on-airport overflow and temporary parking areas. The parking consolidation will result in significant customer service improvements, eliminate labor- and cost-intensive overflow operations, and provide environmental benefits of reducing VMT and associated air emissions. Since the addition of the parking decks will replace other on-airport spaces, the overall capacity at the airport will remain unchanged and within the limits imposed under the Logan Airport Parking Freeze. The management of the parking utilization will continue to be conducted on a daily basis to ensure strict compliance with the Parking Freeze. In addition to the benefits listed above, the new parking decks will simplify the monitoring and reporting of the Logan Airport Parking Freeze compliance.

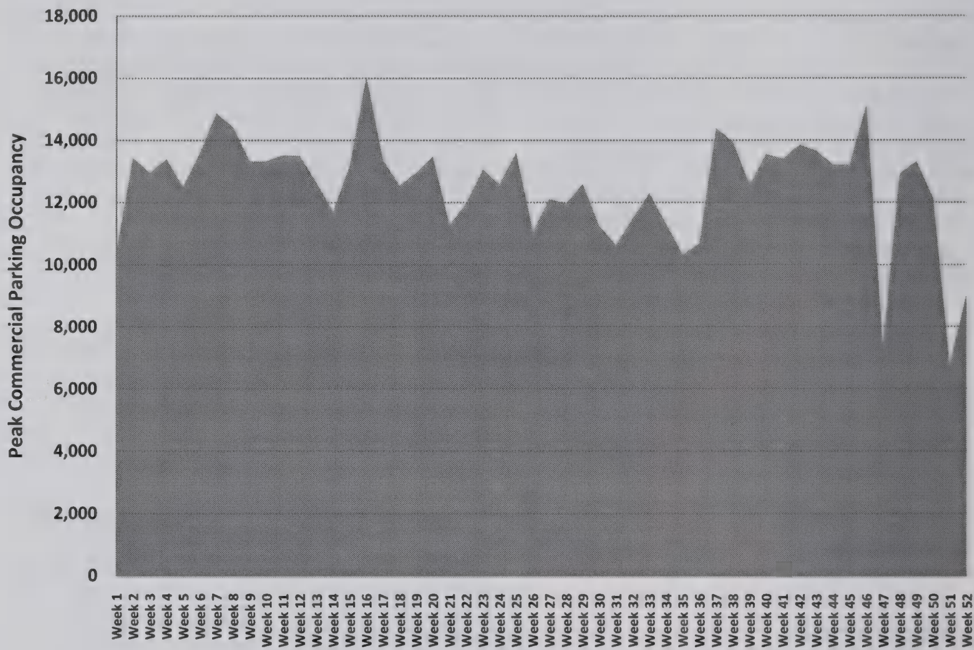
Massport requested an Advisory Opinion from the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) to confirm that the proposed Parking Deck Project would not be subject to the Massachusetts Environmental Policy Act (MEPA). The Secretary's Advisory Opinion, dated June 23, 2010, concurred that the proposed project is not subject to MEPA. Massport is, however, required to report on parking-related issues in the EDRs and ESPRs to ensure that parking issues are comprehensively addressed under MEPA and in compliance with the SIP.

Beginning in 2010, Massport will begin to permanently or temporarily (during ConRAC construction) lose the ability to park vehicles in several overflow surface lots, including the former Post Office lot in the SWSA, Lot B in the South Cargo Area, portions of the "Gulf Station" lot, and the "Sky Chefs" lot in the North Service Area.

Parking Demand

On-Airport commercial parking occupancy typically peaks mid-week (Tuesday through Thursday) with lower occupancies occurring on other days. The number of vehicles parked at Logan Airport in commercial spaces over the course of any 24-hour period was obtained from count data for Tuesdays, Wednesdays and Thursdays throughout 2009, and the results are presented in Figure 5-8. These counts are used to manage the existing supply of spaces and to ensure compliance with the parking freeze. At no time has Massport exceeded the Logan Airport Parking Freeze limit.

Figure 5-8 2009 Commercial Parking Occupancy: Daily Peak by Week



Source: Massport, Ground Transportation Unit.
Note: The chart shows the highest daily count for each week in 2009. The maximum commercial parking spaces permitted by Logan Airport Parking Freeze: 17,319. Maximum commercial parking spaces permitted by Logan Airport Parking Freeze: 17,319. At no time was the Parking Freeze limit exceeded.

Parking Exits by Duration

Total parking activity increased by 11 percent between 2008 and 2009, as presented in Table 5-6. The distribution of parking exits by length of stay essentially remained unchanged in 2009. For example, 54 percent of all parking activity at Logan Airport was for stays of up to four hours, the same share of short-term parking experienced in 2008.

Table 5-6 Parking Exits by Length of Stay

		0-4 hrs.	>4-24 hrs.	>1-4 days	>4 days	Total
2004	Tickets	1,773,175	252,480	722,812	221,108	**2,969,575**
	Percent	59%	9%	24%	8%	100%
2005	Tickets	1,751,761	290,623	723,547	247,874	**3,013,805**
	Percent	58%	10%	24%	8%	100%
2006	Tickets	1,634,898	262,152	660,184	202,366	**2,759,600**
	Percent	59%	10%	24%	7%	100%
2007	Tickets	1,384,947	237,171	659,763	223,132	**2,505,013**
	Percent	55%	9%	26%	9%	100%
2008	Tickets	1,169,277	194,993	591,860	200,292	**2,156,422**
	Percent	54%	9%	27%	9%	100%
2009	Tickets	1,299,898	206,545	660,292	227,334	**2,394,069**
	Percent	54%	9%	28%	9%	100%
Percent Change (2008 to 2009)		**11.2%**	**5.9%**	**11.6%**	**13.5%**	**11.0%**

Source: Massport, Ground Transportation Unit.

2009 Parking Rates

Massport sets and controls parking rates, and has established separate parking rates for the Airport's terminal areas and the Economy lots (refer to Table 5-7). Massport encourages parking fees to be pre-paid at kiosks inside the terminals and pedestrian walkways. Pay stations are located at the entrances to the Central Garage, Terminal B, and Terminal E parking lot. About 80 percent of parking patrons use the pay-on-foot system.

Security restrictions on curbside parking and dwell times, however, have made it necessary for Massport to maintain its parking rates for short-term parking to accommodate pick-up and drop-off activity. Massport has designated hourly parking spaces specifically designed for this purpose and in late 2007 opened a free Cell Phone Waiting Lot located off Harborside Drive.

Many off-Airport parking facilities, such as Pre-Flight parking in Chelsea, are independently owned and operated and are outside of the Logan Airport Parking Freeze. Massport has no control over rates at off-Airport parking lots. The parking rates for the three major off-Airport parking providers (Pre-Flight, Park-Shuttle-and-Fly, and Thrifty) vary from $13.50 to $18.50 for daily parking and from $81 to $105 for weekly parking.

Table 5-7 2009 On-Airport Parking Rates

Location	Cost ($)	Location	Cost ($)
Central Parking, Terminal B Garage, Terminal E Lots 1 and 2		**Economy Parking**	
0 to 30 minutes	$3.00	Daily Rate	$18.00
31 minutes to 1 hour	$6.00	Additional days 0 to 6 hours	$ 9.00
1 to 1.5 hours	$9.00	Additional days 6 to 24 hours	$18.00
1.5 to 2 hours	$12.00	Weekly Rate (6-7 days)	$108.00
2 to 3 hours	$15.00		
3 to 4 hours	$18.00		
4 to 7 hours	$22.00		
7 to 24 hours	$24.00		
Additional days 0 to 6 hours	$12.00		
Additional days 6 to 24 hours	$24.00		

Cell Phone Waiting Lot

In September 2007, 50 parking spaces were assigned to the Cell Phone Waiting Lot, a parking area located off Harborside Drive. Previously, drivers who were waiting for arrivals either used the short-term parking, circulated around the Airport, or dwelled at the curb until asked to move by state police officers. This parking lot provides a hassle-free waiting spot for drivers waiting for passengers on arriving flights. It reduces vehicle emissions by minimizing idling and VMT by such motorists. The maximum wait time permitted at this parking lot is 30 minutes and parking is free of charge.

Spot observations of the lot in 2009 revealed that the peak time of day for its use is typically late afternoon/early evening, when the lot could be at 55 to 70 percent capacity. During peak holiday vacation periods, the lot was observed to be at capacity.

To facilitate ConRAC construction phasing, in late 2010, the Cell Phone Waiting Lot will be relocated to the intersection of Hotel Drive and North Service Road, in an area across the roadway from the American Airline hangar.

2009 Parking Services

Parking PASSport GOLD and Parking PASSport

Massport offers guaranteed parking through its Parking PASSport Gold program. Parking PASSport Gold is offered in dedicated areas of the Terminal B and Central Parking garages, and thereby eliminates the need for a motorist to circle the garage looking for available spaces.

Parking PASSport GOLD and Parking PASSport allow users to enter and exit Logan's parking garages and lots with an access card, which is linked to an established account, for faster payment transactions. Parking fees are automatically charged to a registered credit card and the receipt is emailed to the account holder.

First implemented in 2006, the Parking PASSport GOLD program had 3,631 customers as of December 31, 2009, compared to 3,564 at the end of 2008, and 3,028 at the end of 2007. Customers in the Parking PASSport programs accounted for 2.2 percent of parking exits at Logan Airport in 2009.

Hybrid/Alternative-Fueled Vehicle Preferred Parking

In the State's first preferred parking program for hybrid and AFVs, Massport began offering preferred parking for customers driving hybrid and AFVs in the spring of 2007. Massport created designated preferred parking at the Airport's Central Garage, Terminal B garage, Terminal E surface lot, and economy parking.

Ground Access Planning

Massport has established a number of goals related to the ground access system, parking facilities, and other transportation infrastructure that serve air passengers, Airport employees, and other Airport users. Table 5-8 lists each ground access goal and updates Massport's initiatives associated with each goal. The details of each initiative, where appropriate, have been described in other parts of this chapter.

Massport continues to plan, design and implement ground access initiatives to address these goals. These initiatives are continuously refined to account for the changing national, regional and local environments that affect Logan Airport and its users. Several elements of Massport's Sustainability Initiatives are reflected in the ground access planning activities, which are primarily aimed at reducing reliance on single occupant vehicles for passengers, employees and other Airport users. These measures include:

- Provide, promote and support HOV/shared-ride modes (Logan Express, MBTA, water transportation, etc.);
- Establish, support and actively participate in the Logan TMA; and
- Improve terminal curbside access for HOV modes.

Long-Term Parking and Ground-Access Planning

In 2010, Massport will begin to revise its long-range air passenger forecasts. Using these figures, coupled with new ground-access data from the 2010 Air Passenger Survey, Massport will embark on updating its long-term plans for Logan Airport's parking and ground-access programs.

Bike racks outside of Terminal A. Additional bike facilities are planned for the ConRAC facility highlighted in *Chapter 3, Airport Planning.*

Table 5-8 Ground Access Planning Goals and Progress

Goal	2009 Update
Increase air passenger ground-access HOV mode share to 35.2 percent by the time Logan Airport accommodates 37.5 million annual air passengers	The Logan Airport 2007 Air Passenger Survey demonstrated a 27.8 percent HOV mode share for 28.1 million air passengers. Massport continues to provide and actively promote numerous HOV options that are available to air passengers, including operation of Logan Express. Massport continued work on a long-range Ground-Access Policy Plan, which is investigating ways to increase HOV mode share. The 2010 mode share will be derived from the 2010 Air Passenger Survey and will be reported in the *2010 EDR*.
Reduce employee reliance on commuting alone by private automobile	Massport continues to support the Logan TMA with $65,000 annually as well as space and equipment for the Logan TMA Store in Terminal C. Through a partnership with the MassDOT's MassRIDES program, the Commonwealth provides Massport with a Logan TMA coordinator. This allows Massport to use funds from Logan TMA members exclusively for transportation services, such as the early morning Sunrise Shuttle serving East Boston.
Increase the overall efficiency of the metropolitan transportation system through interagency coordination	Massport participates in the Massachusetts Mobility Compact and the Metropolitan Planning Organization (MPO) to promote planning and funding of transportation system options that enhance access to the Airport. Massport and the MBTA have worked together on several initiatives including the renovated Airport Blue Line station, the Silver Line service extension to Logan Airport, and the Urban Ring planning. In 2009, Massport worked with MassDOT and the MBTA to improve Silver Line signs at the terminal curbside stops.
Improve management of on-Airport ground access and infrastructure through technology	Massport disseminates ground access and parking information through the Internet (www.massport.com), social media (Twitter and Facebook), a toll-free telephone number (1-800-23-LOGAN), Smartraveler, and in-Airport kiosks.
Provide adequate, long-term parking within the limits of the Logan Airport Parking Freeze	The total number of spaces at the Airport remains below the Logan Airport Parking Freeze cap. Massport is consolidating several smaller overflow lots into a two-decked structure atop the existing economy lot at the Robie parcel.

6

Noise Abatement

Introduction

The Massachusetts Port Authority (Massport) strives to minimize the noise effects of Airport operations on its neighbors through the use of a variety of noise abatement programs, procedures, and other tools. Logan Airport has one of the most extensive noise abatement programs of any airport in the nation including: residential and school sound insulation programs; flight tracks designed to optimize over-water operations (especially during nighttime hours); and preferential runway use goals. The foundation of Massport's comprehensive noise abatement program is the *Logan Airport Noise Abatement Rules and Regulations*[1] (the Noise Rules) which have been in effect since 1986. Massport's Noise Abatement Office is responsible for implementing noise abatement measures and generally monitoring community complaints and other aspects of the noise impact from Logan Airport operations.

This chapter describes noise conditions at Logan Airport related to airport operations during 2009 and compares the findings to those for 2008. Noise conditions for 2009 were assessed primarily through computer modeling, supplemented by the analysis of measured noise levels from Logan Airport's new noise monitoring system. Information presented includes summaries of the operational data used in the noise modeling, as well as the resultant annual Day-Night Sound Level (DNL) noise contours, a comparison of the modeled results with measured levels from the monitoring system, and estimates of the population residing within various increments of noise exposure. Analyses also include a number of supplemental metrics including Logan Airport's Cumulative Noise Index (CNI) and reporting on the time above (TA) various threshold sound levels and periods of dwell and persistence of noise levels. Massport's progress on implementing noise abatement measures also is presented.

Key Findings

In 2009, the following changes occurred in the noise environment:

- The decrease in aircraft operations in 2009 resulted in to changes in the noise environment. The 2009 DNL contours were smaller in many locations compared to 2008. The 65 decibel (dB) DNL contour decreased in size in East Boston. The contour reduced in size over Winthrop and towards South Boston from Runway 27 but increased slightly north of the Airport over Revere due to an increase in departures from Runway 4R.

1 *Logan Airport Noise Abatement Rules and Regulations* are codified at 740CMR 24.01 et seq.

The contour also increased south of the Airport over South Boston due to an increase in arrivals to Runways 4L and 4R. These changes were largely due to extended closings of Runway 9-27 for resurfacing in 2009.

- The overall number of people exposed to DNL values greater than 65 dB decreased by 43 percent in 2009, compared to 2008. An estimated 4,335 people were exposed to DNL levels greater than 65 dB as depicted in the 2009 contour, compared to 7,579 in 2008.[2] This is the first time that the number of people exposed to the 65 dB noise level has been fewer than 5,000. All of the residences exposed to DNL levels greater than 65 dB in 2009 that have chosen to participate in the soundproofing program have been sound-insulated by Massport.
- The total population exposed to noise levels greater than DNL 70 dB decreased in 2009 compared to 2008 (Table 6-6). In 2008, the total population greater than DNL 70 dB was 249, and in 2009 the number dropped to 243. There was a reduction of 73 people in Winthrop and an increase of 67 people exposed to greater than DNL 70 dB in Boston, resulting in the slight drop in the total.
- The 2009 CNI of 152.3 Effective Perceived Noise Level (EPNdB) remained well below the cap of 156.5 EPNdB established under Massport's noise regulations. This reduction from the 2008 level reflects the reduction in aircraft operations due to the downturn in the economy.
- In accordance with the mitigation commitments from the Logan Airside Improvements Planning Project,[3] this *2009 Environmental Data Report* (*2009 EDR*) reports on dwell and persistence of noise in the neighborhoods that surround Logan Airport. The level and duration of dwell and persistence has remained the same for areas affected by departures from Runways 22L, 22R and decreased over areas affected by departures from Runways 9, 27, 33L, 4L and 4R.
- In 2009, Massport provided sound insulation to 83 homes, nearly half of which were in Chelsea. The focus of this program in Chelsea was to fulfill federal and state mitigation commitments related to the opening of Runway 14-32. Since the inception of Massport's Sound Insulation program, 11,136 homes have been sound-insulated in East Boston, South Boston, Winthrop, Revere, and Chelsea.

Operational and Runway Use Changes:

- Annual aircraft operations decreased from 371,604 in 2008 to 345,306 (7.1 percent decline) with commercial operations declining 4.0 percent and general aviation operations declining almost in half (48.5 percent decline).
- The number of aircraft operations in 2009 remained below historic peaks (14.6 percent decline since 2004). In addition, daily operations in 2009 averaged approximately 946 compared to approximately 1,015 in 2008, a decrease of about 69 operations per day.

Airspace and Airfield Changes:

- Construction of the centerfield taxiway (Taxiway M) was completed during 2009 and it was fully opened in the summer. The new taxiway improves airfield efficiency by reducing taxiway congestion and allowing for more efficient movement between terminal areas and runways.

2 The 2008 population numbers have been updated using Integrated Noise Model (INM) v7.0b which contains an updated aircraft database.
3 *Logan Airside Improvements Planning Project Final EIS*, Section 4.2.3 PRAS Monitoring and Reporting, June 2002.

- Several parts of Phase 1 of the Boston Logan Airport Noise Study (BLANS) were designed and implemented in 2009. Starting on May 7, 2009, arrivals to Runway 33L could follow a visual approach to Runway 33L over Boston Harbor avoiding flying over Cohasset and Hull. Changes in jet arrivals to Runway 22L from the south were implemented on October 1, 2009, which had aircraft arrivals fly over Boston Harbor.
- The 2009 Flight Track Monitoring report in *Appendix H, Noise Abatement*, shows that the percent of shoreline crossings by aircraft above 6,000 feet remains above 97 percent.
- In 2009, Massport completed installation of an improved Noise Monitoring System (NOMS). The Era Systems Corporation's (ERA) multilateration[4] flight tracking system and all new noise monitors were operational in 2009. Combined with new noise monitor software, the system has an improved capability of correlating measured noise events with individual flight tracks. This has greatly reduced differences between measured and modeled DNL values.
- This is the first year the new flight track data collected from the ERA multilateration system was used for the modeling process. The new flight track data retains 97 percent of the available information for modeling which is an improvement over the 90 percent that the previous system provided.

Noise Metrics

The common metrics used to describe and evaluate aircraft noise in this chapter are:

- The Decibel (dB) – The standard unit of measure for sound. It is a logarithmic quantity reflecting the ratio of the pressure of the sound source of interest and a reference pressure. This logarithmic conversion of sound pressure to sound pressure level results in a sound pressure level of about 0 dB for the quietest sounds that one can detect and sound pressure levels of about 120 dB for the loudest sounds we can hear without pain. Many sounds in our daily environment have sound pressure levels on the order of 30 to 100 dB.
- The Day-Night Average Sound Level (DNL) – A measure of the cumulative noise exposure over a 24-hour day. It is the 24-hour, logarithmic (or energy) average, A-weighted sound pressure level with a 10-dB penalty applied to the nighttime event levels that occur between 10:00 PM and 7:00 AM. The DNL is the FAA-defined metric for evaluating noise and land use compatibility.
- Time-Above a Specified Level, (TA) -- The TA metric describes the total number of minutes that instantaneous sound levels (usually from aircraft) are above a given threshold. For example, if 65 dB is the specified threshold, the metric would be referred to as "TA65." The TA metric is typically associated with a 24-hour annual average day but can be used to represent any time period. Any threshold may be chosen for the TA calculation. For this study, TA65, TA75, and TA85 were computed at each of the monitoring sites.

4 Multilateration (MLAT) is the process of locating aircraft based on the time difference of arrival (TDOA) of its transponder signal to three or more strategically placed receiver stations. A proven technology developed decades ago for the military, MLAT uses small, unmanned ground stations placed strategically around an airport or terminal to provide constant air traffic surveillance. The stations listen for transponder returns or "reply" signals transmitted from local secondary surveillance radar (SSR) or MLAT stations. Because aircraft are located at different distances from each ground station, replies are received at fractionally different times. The stations send the data to a central data processor where sophisticated triangulation and TDOA computations provide the precise position of the aircraft. The Massport system utilizes eight sensors to track aircraft out to at least 30 miles from Logan Airport and Hanscom Field. Source: Era Systems web site (www.sra.com/era/multilateration.php).

Regulatory Framework

FAR Part 36

Logan Airport operates within a framework of federal aviation regulations that limits an airport operator's ability to control noise. For example, the FAA Federal Aviation Regulation (FAR) Part 36 sets noise limits for aircraft certification and the procedures by which aircraft noise emission levels must be measured to determine compliance. The regulation defines noise emission limits for turbojets, turboprops, and helicopters, classifying turbojets into categories referred to as stages based on noise levels at each of three locations: takeoff, landing, and to the side of the runway during takeoff (sideline). The stages are:

- Stage 1 aircraft are the oldest and usually loudest operations, having preceded the existence of any noise emission regulation. Rare examples include old, restored civil or military aircraft. No Stage 1 aircraft operate at Logan Airport.
- Stage 2 aircraft are less old and less noisy than Stage 1; they were the first aircraft types required to meet a noise limit. A subsequent regulation, FAR Part 91 (see below) prohibits the operation of a Stage 2 aircraft in the continental United States (U.S.) unless its takeoff weight is 75,000 pounds or less.
- Stage 3 aircraft were built before 2006 and are relatively quiet commercial jets, though some are Stage 2 aircraft fitted with hushkits to allow them to meet the Stage 3 noise limits.
- Stage 4 aircraft are the newest and quietest of the commercial jets. These aircraft will be required to operate with noise levels at least 10 dB quieter than Stage 3 aircraft. Jet aircraft certificated after January 1, 2006, must meet the Stage 4 limits. Though not required, the majority of aircraft in the 2009 Logan Airport fleet would also meet the new Stage 4 noise limits, if they were recertificated.

FAR Part 150

First implemented in February 1981, FAR Part 150 defines procedures that an airport operator must follow if it chooses to conduct and implement an airport noise and land use compatibility plan. Part 150 Noise Compatibility studies require the use of DNL to evaluate the Airport noise environment. FAR Part 150 identifies noise compatibility guidelines for different land uses depending on their sensitivity. Key values include a DNL of 75 dB, above which no residences, schools, hospitals, or churches are considered compatible and a DNL of 65 dB, above which those land uses are considered compatible only if they are sound insulated.

Noise abatement or mitigation measures that an airport operator must consider in a Part 150 study include acquisition of incompatible land, construction of noise barriers, sound insulation of buildings, implementation of a preferential runway program, use of noise abatement flight tracks, implementation of airport use restrictions, and any other actions that would have a beneficial effect on the public.

While Massport has implemented variations of all of these and additional measures at Logan Airport, Massport has not filed an official Part 150 noise compatibility study with the FAA because all of Logan Airport's program elements, while regularly reviewed and updated, preceded the promulgation of Part 150 and are effectively grandfathered under the regulation.

FAR Parts 91 and 161

When Congress adopted Public Law (PL) 101-508, subtitled the *Airport Noise and Capacity Act of 1990* (the Act), it required the U.S. Secretary of Transportation to:

- Establish a schedule for the phase-out of Part 36 Stage 2 aircraft by the year 2000;
- Establish a program for FAA review of all new airport noise and access restrictions limiting operations of Stage 2 aircraft; and
- Establish a program for FAA review and approval of any restriction that limits operations of Stage 3 aircraft.

Part 91, set the schedule for conversion of Stage 2 aircraft to meet Stage 3 noise limits by December 31, 1999, but exempted aircraft less than 75,000 pounds maximum gross takeoff weight. This excluded, and still excludes, most business jets. Part 91 also permitted operators of the heavier aircraft to be retrofitted or operating manuals to be modified and the aircraft to be recertificated to meet minimum Stage 3 noise limits resulting in only minimal improvements in noise for some aircraft types. Though many of these aircraft have since been taken out of service voluntarily, primarily due to high operating costs, a few remain in the cargo and charter fleets operating at Logan Airport.

The other elements of the Act were addressed through FAR Part 161. It prescribes detailed benefit/cost analyses and notice requirements for an airport operator to follow if the operator wants to adopt a Stage 2 or Stage 3 noise or access restriction. Although several airports have embarked on such efforts in the past 16 years, only one, a general aviation (GA) airport (Naples Airport, Florida), has been found by FAA to have complied with Part 161 analysis, notice, and documentation requirements, for a ban on Stage 2 jet operations. Even in that particular case, however, FAA found the airport to be in violation of prior FAA grant assurances.

Promulgated in 1986, the Logan Airport Noise Rules preceded the requirements of Part 161 and are grandfathered under the regulation. Future, more stringent amendments or alternative regulatory initiatives imposing noise or access restrictions on Stage 3 aircraft would likely require review and FAA approval under Part 161. In 2006, Massport requested an opinion from the FAA regarding the pursuit of a Part 161 waiver. FAA informed Massport that a waiver or exemption from the requirements of Part 161 is not authorized under, or consistent with, federal statutory and regulatory requirements. A copy of FAA's letter to Massport was provided in *Appendix H, Noise Abatement*, of the *2005 EDR*.

Logan Airport Noise Abatement Rules and Regulations

Massport's primary mechanism for reducing noise impacts from Logan Airport's operations is the Noise Rules. The Noise Rules were designed to reduce noise impacts by encouraging use of quieter aircraft; by requiring decreased use of noisier aircraft; and, by limiting nighttime activity by louder Stage 2 types. Many secondary goals aimed at limiting noise in specific areas also were stated.

Specific provisions of the Noise Rules, which continue to serve these goals, include:

- Limiting cumulative noise exposure at Logan Airport (as measured by Massport's CNI) to a maximum of 156.5 EPNdB;

- Maximizing use of Stage 3 aircraft;
- Restricting nighttime operations by Stage 2 aircraft;
- Placing limitations on times and locations of engine run-ups and use of auxiliary power units; and
- Restricting use of certain runways by noisier aircraft and time of day.

Noise Modeling Process

The DNL, CNI, and TA noise metrics reported annually by Massport provide various means of interpreting and comparing Logan Airport's complex noise environment from one year to the next. The noise context is influenced by numbers of operations, types of aircraft operating during the day and at night, use of various runway configurations, and the location and frequency of use of flight paths to and from the runways. Changes in any one of these operational parameters from one year to the next can cause changes in the values of the noise metrics and alter the shapes of the noise exposure contours that represent the accumulation of noise events during an average day.

Massport continues to make use of the state-of-the-art improvements in the noise modeling process, which has been updated each year. These developments in noise modeling technologies and techniques, which were first employed in the preparation of the *2005 EDR*, and have continued through this *2009 EDR* and will be used in future years, include:

- Continued use of the latest update to the FAA's Integrated Noise Model (INM), while retaining the unique capability to account for over-water sound propagation and hill effects at Logan Airport. The INM has been updated to INM Version 7.0b (INMv7.0b). Massport's use of the latest FAA-approved version of the INM (INMv7.0b), along with additional provisions approved by FAA to accommodate the Airport's unique water and terrain characteristics that have been shown through earlier technical studies to affect sound propagation into surrounding neighborhoods, has improved the modeling results. Logan Airport is the only airport in the world that incorporates these features into its approved modeling process.
- This *2009 EDR* is the first time the multilateration flight track data has been used for all aspects of the modeling process. The *2008 EDR* reported on measured data and complaints which were determined from the NOMS system using the multilateration flight track data but the noise modeling was developed using the airports PASSUR[5] flight track data. The NOMS system efficiently provides Massport with a higher quality and more complete set of radar data to be more responsive to operational and noise issues at the Airport.
- The flight operations data from the new NOMS system includes more information with each flight record such as aircraft registration numbers wherever possible which provide better INM aircraft type selection. The new NOMS system collects a more complete set of aircraft identification data than the PASSUR system. The improved data allows INM aircraft type selection based on the specific aircraft and engine combination used at Logan Airport during 2009.
- For 2009, as in the *2008 EDR*, all modeling included the use of digital terrain data. INMv7.0b uses improved terrain data allowing the model to evaluate each receptor location at its proper elevation, which enhances the accuracy of the results.

5 PASSUR flight track data is a product of PASSUR Aerospace. The flight track data is passively acquired from the FAA radar at the airport.

- Use of automated altitude profile and noise contour generation software. Massport purchased licenses to run two additional software packages, RealProfiles™ and RealContours™. The *2004 ESPR* included a comparative analysis of the results of the standard INM modeling approach with RealProfiles™ and RealContours™.
  - RealContours™ automates the production of noise contours directly from every individual radar trace. Approximately 340,990 traces were collected from the system and 332,027 traces retained enough information to be modeled in the RealContours™ system. Each radar trace was converted to an INM model track, ensuring that the lateral dispersion of radar tracks was retained in the modeling. The operations on these radar traces were then scaled to account for all of the 345,306 operations in 2009. This method also helps to develop more accurate noise contours by retaining the actual runway used and time of each operation.
  - RealProfiles™ analyzes each radar trace and automatically produces custom aircraft performance profiles using the INM aircraft database. The INM typically uses pre-defined profiles to "fly" each aircraft along the ground track. The custom profiles are designed to follow the actual flight of each aircraft allowing the INM to model each flight at its actual location on the ground and in the sky. Due to changes in the INM model (Airbus aircraft now have new arrival data to support RealProfiles™), many more arrival profiles are available for use with RealProfiles™. A total of 306,850 flight tracks (92.4 percent) used these specially designed profiles of which 163,134 (97.5 percent) of the available departure profiles and 143,716 (87.3 percent) of the available arrival profiles are profiles developed from the actual radar data.
- Accurate altitude modeling by using the aircraft performance profiles developed by RealProfiles™ from the radar data captured by Logan Airport's NOMS tracking system. A profile was developed for each flight track departing from and arriving to each runway end to assure that the altitude profiles represented as accurately as possible the aircraft's performance during arrival or departure. This technique has been used since the *2004 ESPR* and improves the accuracy of each aircraft's modeled altitude over surrounding communities.
- Continued development and refinement of an improved noise and operations monitoring system. This *2009 EDR* uses the new multilateration radar data which has better coverage of the surrounding area and more data points. The PASSUR system contains radar data returns every 4.7 seconds whereas the new system has returns every second. This results in a more complete and accurate flight track. All of the new noise monitors were operational for 2009. Combined with new noise monitor software, the system has an improved capability of correlating measured noise events with individual flight tracks.

All of these enhancements are examples of Massport's continued commitment to improving the monitoring, reporting, and understanding the noise environment at Logan Airport. The following section of this chapter summarizes the basic operational data used to compute the DNL, CNI, and TA noise metrics reported for 2009.

Noise Model Inputs

The FAA's INMv7.0b was released for general use on September 30, 2009, and now replaces INMv7.0a used in the *2008 EDR*, as the primary analytical tool used to assess the noise environment at Logan Airport. The modeling also includes provisions for over-water sound propagation and hill effects that have been tailored to the local environment and approved by FAA's Office of Environment and Energy (AEE) based on previous

special studies. Documentation of these features is included in earlier editions of EDRs and ESPRs. A comparison of the enhancements between INMv7.0b and INMv7.0a is included in *Appendix H, Noise Abatement*.

The INM requires detailed operational data as inputs for its noise calculations, including numbers of operations per day by aircraft type and by time of day, which runway for each arrival and for each departure, and flight track geometry for each track. These data are summarized in tables which follow or are included in *Appendix H, Noise Abatement.*

For this *2009 EDR*, Massport continued to use the new pair of software packages known as RealProfiles™ and RealContours™. They incorporate INMv7.0b as the computational engine for calculating noise, but they operate on individual flight tracks taken directly from radar systems rather than on consolidated prototype flight tracks used in reports prior to 2004. *Appendix H, Noise Abatement* provides a summary discussion of RealProfiles™ and RealContours™. The *2004 Environmental Status and Planning Report (ESPR)* described the software in greater detail, and compared the results between the new software and typical modeling.

INMv7.0b Improvements

The FAA updated INMv7.0b to improve the accuracy of estimated noise contours. Nine of the Airbus aircraft have added arrival flight performance data which allow RealProfiles™ to develop custom arrival profiles. Eleven new aircraft types including several in use at Logan Airport have been added to the INM database. Corrections were made to reverse thrust implementation and whether the aircraft is still on the ground. These enhancements have improved the modeled results from INMv7.0b compared to INMv7.0a. Massport reran the 2008 contour with INMv7.0b in order to more accurately depict 2008 noise contours. The *2008 EDR* documented and compared the changes between INMv7.0 and INMv7.0a and the *2009 EDR* documents the changes between INMv7.0a and INMv7.0b. As the most recent FAA model, INMv7.0b results are the official data for the *2009 EDR* and for the 2008 rerun of the 65 dB noise contours.

RealContours™ and RealProfiles™

This software incorporates the FAA-approved INMv7.0b as the computational engine for calculating noise, but provides greater detail through the uses of individual flight tracks taken directly from radar systems rather than relying on consolidated, representative flight tracks data.

RealContours™ improves the precision of modeling by:

- Directly converting the radar flight track for every identified aircraft operation to an INM track, rather than assigning all operations to a limited number of prototypical or representative tracks.
- Modeling each operation on the specific runway that it actually used, rather than applying a generalized distribution to broad ranges of aircraft types.
- Selecting the specific airframe and engine combination to model, on an operation-by-operation basis, based on the published composition of the fleets of the specific airlines operating at Logan Airport.
- Using each aircraft's actual performance and altitude profile to develop inputs to the model which define the actual arrival or departure profile.

RealContours™ uses INMv70b to produce computations for each day of radar data and then compiles annual average noise exposure contours and supplemental metrics from each of the 365 days of computations.

The following section summarizes the average-day operations for 2009 used in the noise modeling and compares them to 2008 data.

Fleet Mix

Since 2004, Massport has relied heavily on radar data as the primary source of input for noise calculations, since radar data typically are more accurate than the information reported by air carriers. These radar data typically result in a list of approximately 500 different aircraft types that use Logan Airport during a year, including the wide variety of small corporate jets and propeller aircraft flown by GA users, as well as the large passenger and cargo jets operated by air carriers.

For 2009, aircraft types at Logan Airport were matched to the INMv7.0b database, which contains individual noise and performance profiles for 265 different fixed-wing aircraft types, 150 of which represent civilian aircraft, the balance being military aircraft.[6] For those aircraft recorded in radar data that are not in the INM's database, the radar type is paired with the best available alternative using a standard FAA-approved substitution list. The final list of modeled aircraft, used as an input to the INM, is presented in detail in *Appendix H, Noise Abatement*.

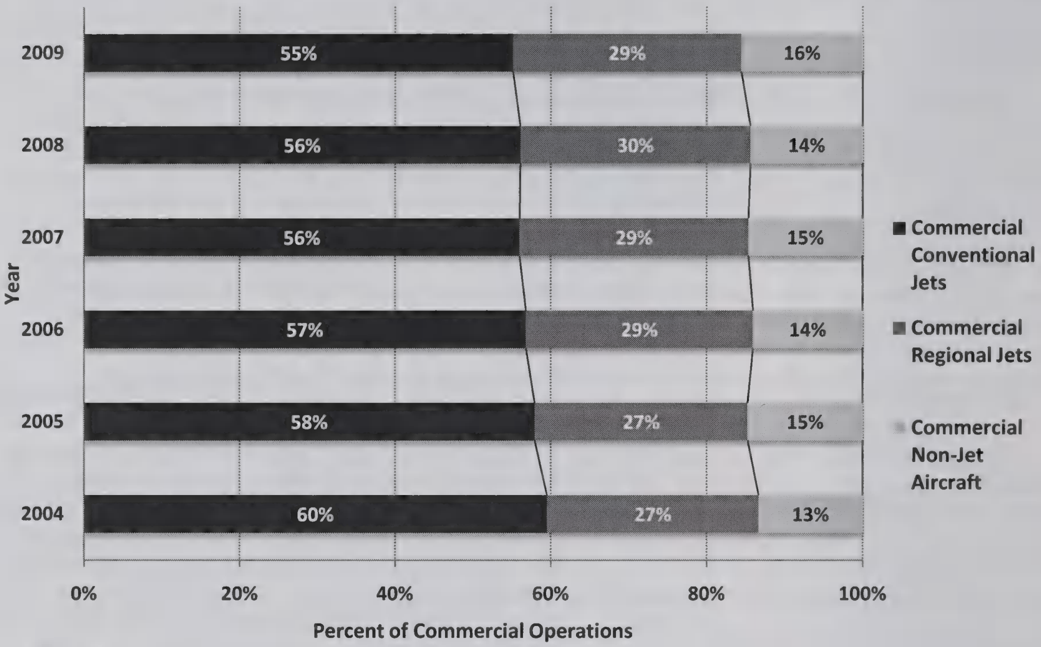
As in previous ESPRs and EDRs, operations by aircraft types have been summarized into several key categories: commercial (passenger and cargo) operations, Stage 2 or Stage 3 jet aircraft, and turboprop and propeller (non-jet) aircraft. Aircraft which meet Stage 4 jet requirements were also broken out from the Stage 3 jet aircraft data for 2009. These Stage 4 aircraft are defined as aircraft certified as Stage 4 and all Stage 3 aircraft which *if recertified* would qualify for Stage 4. FAA does not require aircraft to be recertified and there are no plans at this time to restrict Stage 3 operations. In addition, the operations are split into daytime and nighttime periods, where nighttime hours are defined as 10:00 PM to 7:00 AM, consistent with the definition of DNL. Table 6-1 summarizes the numbers of operations by categories of aircraft operating at Logan Airport in 2009 and includes similar data for 2008 and prior years back to 2004. Data prior to 2004 are included in *Appendix H, Noise Abatement*. Descriptions of Stage 2, Stage 3 and Stage 4 jet aircraft and nighttime operations follow Table H-9.

Commercial Operations

Compared to 2008, the number of average daily operations (Table 6-1) indicates a decrease in air carrier activity, with overall commercial traffic decreasing by 4.0 percent in 2009. Commercial traffic includes both passenger and cargo operations. Modeled conventional air carrier jets (jet aircraft with more than 100 seats) decreased by 5.2 percent, while modeled regional jets (or RJs which are jet aircraft with less than 100 seats) operations decreased by 5.4 percent. Non-jet operations were the only type of commercial category to grow from 2008 to 2009, with an increase of 4.0 percent. Nighttime commercial operations (between 10:00 PM and 7:00 AM) in 2009 declined 8.2 percent compared to 2008. Figure 6-1 presents the operations groups in terms of percent of the total for each year. Conventional commercial jets make up more than 50 percent of the fleet in 2009 but have dropped slightly from 2008. Commercial regional jets make up the remainder of the more than 80 percent of commercial jet operations, but non-jet commercial operations have increased in 2009 most likely due to the addition of airlines such as Porter Air, which operate 70-seat Bombardier Quiet 400 turboprop aircraft, and an increase in Cape Air Flights, which operates Cessna 402s.

6 Some of these are military types as well as older Stage 1 and 2 airplanes that no longer operate in the U.S. or do not operate at Logan Airport. There are ordinarily no military aircraft operations at Logan Airport.

Figure 6-1 Fleet Mix of Commercial Operations (Passenger and Cargo) at Logan Airport



Source: HMMH 2010

1 Includes both passenger and cargo operations.

2 Conventional jets are aircraft with more than 100 seats.

3 Regional Jets are aircraft with fewer than 100 seats.

Table 6-1 Modeled Average Daily Operations by Commercial and General Aviation Aircraft[1,2]

		2004	2005	2006	2007	2008	2009
Commercial Aircraft							
Stage 2 Jets[3]	Day	0.03	0.05	0.03	0.03	0.01	0.00
	Night	0.01	0.01	0.00	0.01	0.01	0.00
	Totals	**0.05**	**0.06**	**0.03**	**0.04**	**0.02**	0.00
Stage 3 Jets (All)	Day	772.39	765.76	767.55	748.13	699.39	667.45
	Night	113.24	113.66	114.81	118.29	114.30	103.05
	Totals	**885.63**	**879.42**	**882.36**	**866.42**	**813.69**	**770.50**
Conventional Jets[3]	Day	518.96	505.48	490.63	472.39	443.15	422.92
	Night	89.24	91.99	92.71	96.28	89.89	82.21
	Totals	**608.20**	**597.47**	**583.34**	**568.66**	**533.04**	**505.14**
Regional Jets[4]	Day	253.43	260.34	276.95	275.77	256.24	244.53
	Night	24.00	21.68	22.11	22.03	24.40	20.84
	Totals	**277.43**	**282.01**	**299.06**	**297.80**	**280.64**	**265.37**
Non-Jet Aircraft	Day	133.24	148.77	140.81	145.27	132.52	136.43
	Night	3.03	3.02	3.26	3.47	4.00	5.56
	Total	**136.28**	**151.79**	**144.07**	**148.73**	**136.52**	**141.99**
Total Commercial Operations	Day	905.66	914.59	908.41	893.43	831.92	803.88
	Night	116.29	116.68	118.09	121.77	118.31	108.62
	Total	**1021.95**	**1031.27**	**1026.51**	**1015.19**	**950.23**	**912.50**
GA Aircraft							
Stage 2 Jets[5]	Day	0.94	2.29	1.90	1.24	0.36	0.09
	Night	0.14	0.25	0.17	0.19	0.03	0.01
	Total	**1.08**	**2.54**	**2.07**	**1.43**	**0.38**	**0.10**
Stage 3 Jets	Day	53.72	58.84	61.08	54.82	43.98	22.18
	Night	8.37	9.33	6.57	6.39	4.52	2.33
	Total	**62.09**	**68.16**	**67.65**	**61.21**	**48.49**	**24.51**
Non-Jets	Day	16.95	14.00	15.05	11.98	15.13	8.19
	Night	5.20	4.75	1.39	3.61	1.08	0.75
	Total	**22.14**	**18.75**	**16.44**	**15.58**	**16.20**	**8.93**
Total GA Operations	Day	71.60	75.12	78.03	68.04	59.46	30.46
	Night	13.71	14.33	8.13	10.19	5.62	3.08
	Total	**85.31**	**89.46**	**86.15**	**78.22**	**65.08**	**33.54**
Total	Day	977.27	989.71	986.43	961.46	891.39	834.33
	Night	130.00	131.02	126.22	131.96	123.93	111.70
	Total[3]	**1107.26**	**1120.73**	**1112.66**	**1093.42**	**1015.31**	**946.03**

Source: Massport's Noise Monitoring System, Revenue Office numbers, HMMH 2010.

1 Includes scheduled and unscheduled operations.

2 Data for years prior to 2004 is available in *Appendix H, Noise Abatement*.

3 Conventional Jets include both passenger and cargo operations from aircraft with greater than 100 seats.

4 Regional Jets include both passenger and cargo operations from aircraft with fewer than 100 seats.

5 Stage 2 aircraft are exempt from meeting newer federal Stage 3 noise limits when their certificated maximum gross takeoff weight is less than or equal to 75,000 pounds.

General Aviation Operations

Modeled GA activity exhibited a 48.5 percent decrease, from more than 65 daily operations in 2008 to approximately 33 daily operations in 2009 (Table 6-1). Use of Stage 2 GA jets decreased by 74.8 percent; use of Stage 3 GA jets decreased by 49.5 percent. Non-jet GA activity in 2009 decreased by 44.9 percent from 2008. Overall GA nighttime operations decreased by 45.1 percent, from 5.6 operations per night in 2008 to 3.1 per night in 2009.

Stage 2, Stage 3, and Stage 4 Jet Aircraft

Jet aircraft currently operating at Logan Airport are categorized by FAA into three groups: Stage 2, Stage 3 and Stage 4. As described previously, the designation refers to a noise classification specified in FAR Part 36 that sets noise emission standards at three measurement locations—takeoff, landing, and sideline—based on an aircraft's maximum certificated weight. The heavier the aircraft, the more noise it is permitted to make within limits.

The *Airport Noise and Capacity Act of 1990* (and its implementing regulations known as FAR Part 91), required operators of Stage 2 airplanes weighing more than 75,000 pounds to transition to Stage 3 aircraft by phasing out the older, noisier airplanes by December 31, 1999. Stage 2 aircraft weighing less than or equal to 75,000 pounds (most of them used in GA or for small commercial activities such as transporting checks between Federal Reserve Banks) are exempt from the phase-out deadline and have continued to fly after December 31, 1999.

Stage 4 aircraft are currently being added to the airlines' fleets as they add new aircraft. The new Stage 4 noise standard applies to any new jet aircraft type designs over 12,500 lbs requiring FAA approval after January 1, 2006. The International Civil Aviation Organization (ICAO) has already adopted a similar regulation for international operators, but neither the FAA nor ICAO has indicated any movement towards restricting the remaining recertificated Stage 3 aircraft from carrier fleets. Because of the substantial differences in noise between Stage 2, recertificated Stage 3, Stage 3 aircraft, and aircraft that meet Stage 4 requirements, Massport tracks operations by these categories to follow their trends. Table 6-2 provides the percentage of commercial jet operations by stage since 2004. The majority of the commercial jet fleet meets Stage 4 requirements. Certificated Stage 3 aircraft as a percentage of the commercial jet fleet remained consistent with 2008 accounting for 99.1 percent of the commercial jet fleet in 2009.

Table 6-2 Percentage of Commercial Jet Operations by Part 36 Stage Category[1]

Year	Stage 4 Requirements[2]	Certificated Stage 3	Recertificated Stage 3[4]	Stage 2	Total
2004		97.8%	2.2%	0.0%	100%
2005		98.0%	2.0%	0.0%	100%
2006		98.6%	1.4%	0.0%	100%
2007		98.9%	1.1%	0.0%	100%
2008		99.1%	0.9%	0.0%	100%
2009	98.4%[3]	99.1%[3]	0.9%[5]	0.0%	100%

Source: Massport and Era radar data. HMMH 2010.

1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*

2 Aircraft that meet Stage 4 requirements are aircraft which are certificated Stage 4 or would qualify if recertificated. Certificated Stage 4 aircraft were not available until 2006 and the level of aircraft that meet Stage 4 requirements has not been determined for 2006 through 2008.

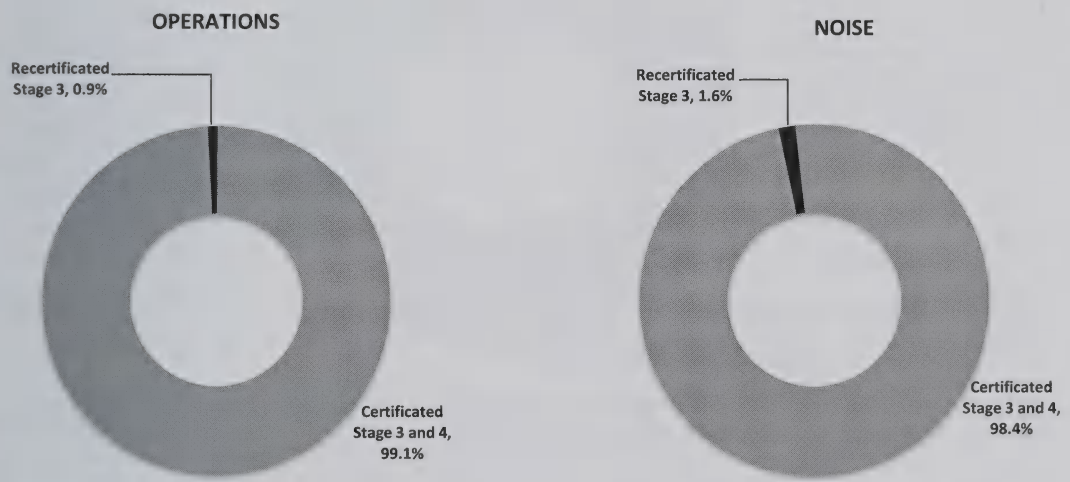
3 All aircraft listed as meeting Stage 4 requirements are also listed as Stage 3 aircraft.

4 Recertificated Stage 3 aircraft are aircraft originally manufactured as a certificated Stage 1 or 2 aircraft under FAR Part 36 which have been either retrofitted with hushkits or have been re-engined to meet Stage 3 requirements.

5 Only five commercial carriers continue to use recertificated Stage 3 aircraft at Logan Airport (Delta Air Lines, Capital Cargo Intl, FedEx, DHL, and a few charter operators).

Figure 6-2 charts show the relative contributions of these aircraft groups to total commercial operations at Logan Airport compared to their contribution to total noise. The comparison illustrates the stronger than average influence that recertificated aircraft have on noise exposure, accounting for almost 0.9 percent of the commercial jet operations but creating approximately 1.6 percent of the noise exposure. While the level of recertificated Stage 3 aircraft did not change from 2008, the percentage used at night has dropped (night operations include the 10dB nighttime penalty), which is responsible for the drop in the noise contribution from 3 percent in 2008 to 1.6 percent in 2009.

Figure 6-2 Relative Contributions of Commercial Jet Operations and Noise at Logan Airport in 2009



Source: Massport, HMMH Analysis 2010.
Note: Noise calculations include the 10 dB nighttime penalty. There are no Stage 2 commercial operations.

Nighttime Operations

Although Stage 2 aircraft over 75,000 pounds have been banned since January 1, 2000, aircraft certificated as Stage 2 which weigh less than 75,000 pounds have continued to operate in the U.S. Stage 2 aircraft currently allowed to operate are small corporate jet size aircraft that are primarily in the GA fleet. However, there have been discussions regarding the development of a ban for these aircraft as well. Logan Airport's Noise Rules prohibit Stage 2 aircraft of less than 75,000 pounds from using the Airport between the hours of 11:00 PM and 7:00 AM. Massport's PREFLIGHT™ system[7] alerts Noise Abatement Office staff of potential violations when they occur. PREFLIGHT™ software is used to assist in compiling fleet, day/night splits, and runway use information from Massport's PASSUR radar data.

7 Prior Flight track processing system which is still operating.

In addition, Massport takes note of flights that operate between the broader DNL nighttime periods of 10:00 PM to 7:00 AM, when each flight is penalized 10 dB in calculations of noise exposure. Table 6-3 shows this nighttime activity by different groups of aircraft. Nighttime flights by commercial jet operations decreased by 9.8 percent from 114.3 per night in 2008 to 103.1 per night in 2009 and nighttime flights by commercial non-jet operators increased by 39.1 percent from 4.0 per night in 2008 to 5.6 per night in 2009. Nighttime GA operations fell 45.1 percent. These changes resulted in an overall decrease in nighttime operations of 9.9 percent in 2009. The majority of nighttime operations (between 10:00 PM and 7:00 AM) occurred either before midnight or after 5:00 AM. These nighttime operations represent 11.8 percent of total operations at Logan Airport.

Table 6-3 Modeled Nighttime Operations (10:00 PM to 7:00 AM) at Logan Airport Per Night[1]

	Commercial Jets	Commercial Non-Jets	General Aviation[1]	Total
2004	113.26	3.03	13.71	130.02
2005	113.67	3.02	14.33	131.02
2006	114.83	3.26	8.13	126.22
2007	118.30	3.47	10.19	131.96
2008	114.30	4.00	5.62	123.93
2009	103.05	5.56	3.08	111.70
Change (2008 to 2009)	(11.25)	1.56	(2.54)	(12.23)
Percent Change	(9.84%)	39.1%	(45.13%)	(9.87%)

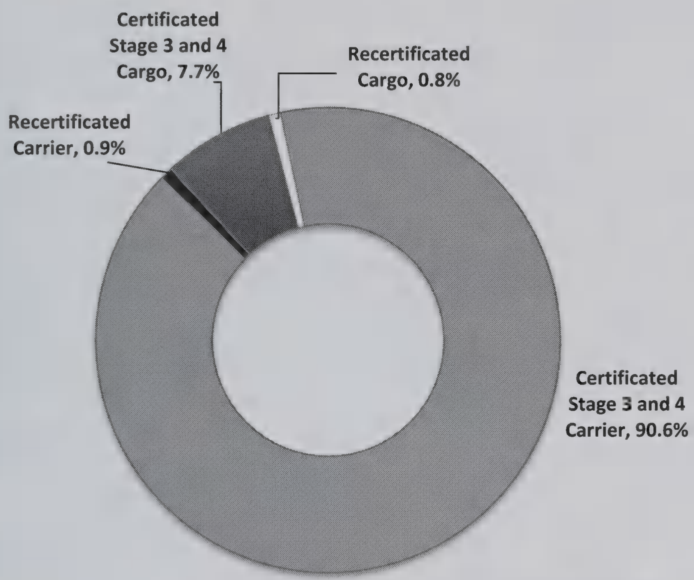
Source: Massport and ERA radar data. HMMH 2010
Commercial traffic includes both passenger and cargo operations
1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*

Figure 6-3 shows the nighttime jet commercial activity by air carrier and cargo operators. It shows that cargo operations accounted for 8.5 percent of all commercial nighttime operations in 2009. Other findings indicate:

- There was a reduction overall in nighttime cargo flights which comprised 9.4 percent of the total commercial night operations in 2008, and in 2009 comprised only 8.5 percent of the total. This also resulted in an increase in the percentage of passenger operations as part of total commercial nighttime flights.
- Although 0.8 percent of all commercial night flights were flown by cargo operators using recertificated Stage 3 aircraft, this is an improvement from 2008 when 2.2 percent of the nighttime cargo operations were recertificated Stage 3 aircraft.
- In 2009, passenger airlines flew 0.9 percent of total night operations in recertificated Stage 3 aircraft compared to 0.3 percent in 2008. This increase is primarily due to the Northwest-Delta Air Lines merger as they shift their DC9 fleets into different markets.

Though ICAO and the FAA are not expected to require the phase-out of the remaining recertificated operations prevalent among cargo operators, the use of these aircraft will continue to decline in the future as these aircraft age.

Figure 6-3 Commercial Nighttime Jet Operations Part 36 Stage Breakdown (2009)

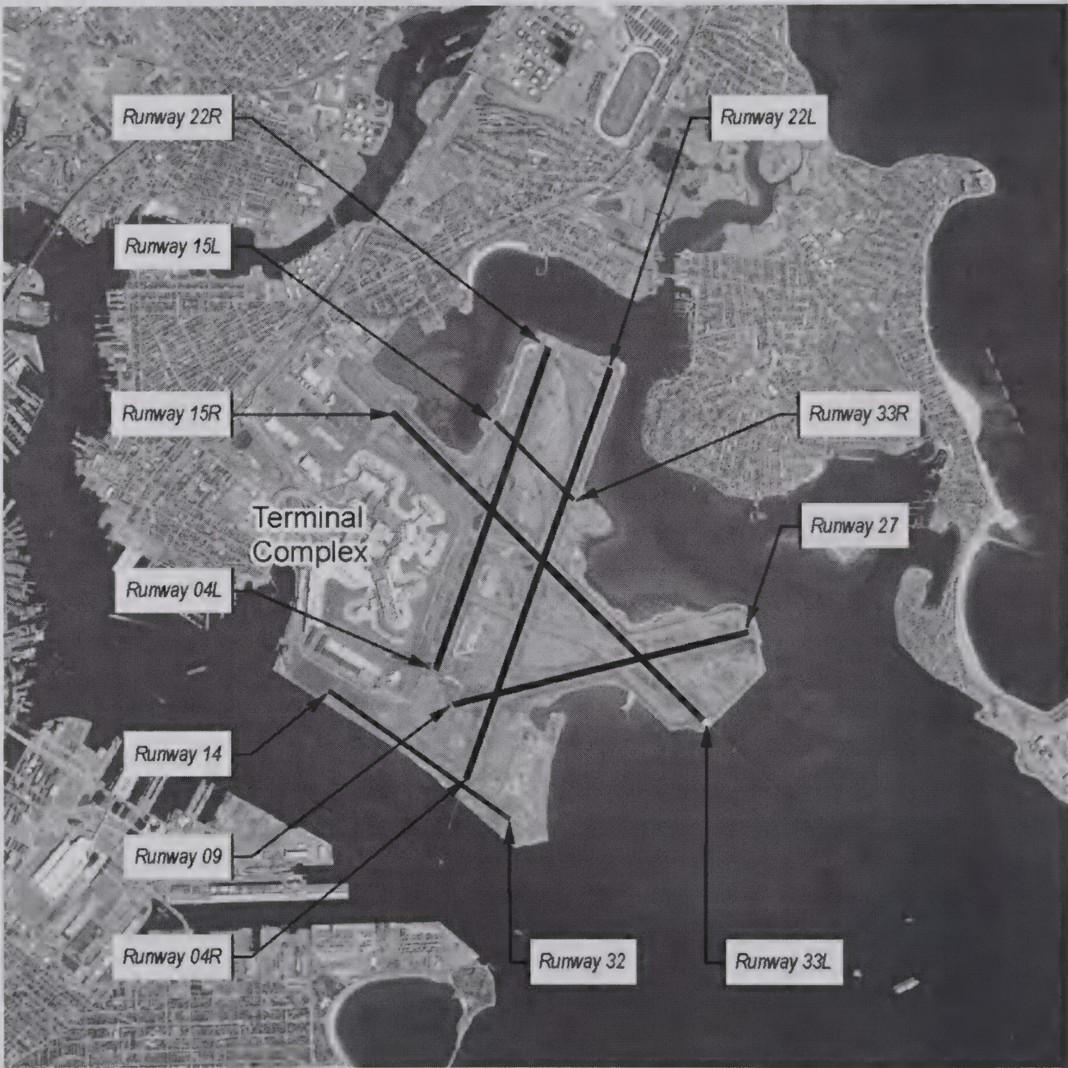


Notes: Full Stage 3 refers to originally manufactured Stage 3, which do not meet Stage 4 requirements.
Stage 4 refers to originally manufactured Stage 4 and Stage 3 which meet Stage 4 requirements.
Stage 2 Day and Night operations contribute less than 0.5 percent of operations.
Noise calculations include the 10 dB nighttime penalty.

Runway Use

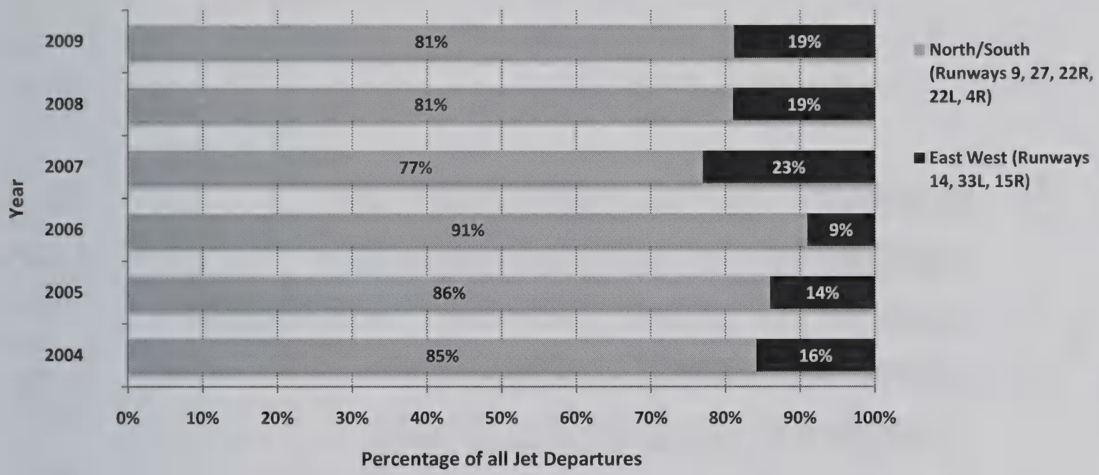
Logan Airport's runways are shown in Figure 6-4. Runway use refers to the frequency with which aircraft utilize each of these runways during the course of the year, as dictated or permitted by availability, wind, weather, aircraft performance, demand, and air traffic control conditions. Runway 15R-33L and Runway 4R-22L are Logan Airport's longest runways; each is just over 10,000 feet in length. Runway 15R-33L is the preferred runway at night, with arrivals to Runway 33L and departures from Runway 15R, thus keeping flights over Boston Harbor. Runway 22R is used primarily for departures, and Runway 22L is used primarily for arrivals. Runway 9 is used for departures, and Runways 15R, 27, and 33L are used for both arrivals and departures. Runway 14-32 is unidirectional; there are no arrivals to Runway 14 and no departures from Runway 32. Additionally, Runway 14-32 can be used only during northwest wind conditions when winds are 10 knots or greater. Under certain northwest wind conditions, Runway 14-32 provides the FAA with a second arrival runway, thereby reducing delays at the Airport.

Figure 6-4 Logan Airport Runways



Source: HMMH, Inc. 2010, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.

Figure 6-5 Jet Departures by Operating Direction



Runway use conditions in 2009 were as follows:

- Overall the Airport continued to be characterized by a north-south operating flow in 2009. Jet aircraft departures operated in this flow 81 percent of the time as shown in Figure 6-5.
- Combined arrivals to Runways 4L and 4R increased by 1 percent to 38 percent in use of both Runways 4L and 4R in 2009 compared to 2008. Departures from Runway 4R increased by 1 percent from 2008.
- Arrivals to Runway 22L remained at 17 percent in 2009. Departures on Runway 22L remained at 36 percent. Runway 22R arrivals decreased by 2 percent over 2008, with a corresponding 2 percent increase on Runway 22L. Runway 22R remained consistently the most used departure runway at Logan Airport. The new multilateration flight tracking system processes the parallel runway assignments better than the previous system, making the noise analysis more accurate.
- Departures on Runway 27 remained at 6 percent in 2009, and departures on Runway 9 decreased to 32 percent in 2009. Arrivals to Runway 27 decreased from 33 percent in 2008 to 30 percent in 2009 compared to 2008. During 2009, Runway 9-27 had extended weekend closings for resurfacing.
- Departures on Runway 33L remained at 16 percent in 2009, and departures on Runway 15R remained at 3 percent in 2009. Arrivals to Runway 15R increased from 2 percent in 2008 to 3 percent in 2009. Arrivals to Runway 33L remained the same at 11 percent compared to 2008. The departure use of Runways 33L and 27 are shown in Figure 6-6.

- For the third full year since opening in late November 2006, Runway 14-32 was used primarily for arrivals of regional jets and turboprops over Boston Harbor, accounting for 1 percent of annual jet arrivals, down from 2 percent in 2008. While the time Runway 32 was available (due to the wind restriction) was greater than in 2008, Runway 33L was also available and had a higher use by regional jets.

Figure 6-6 Runway 27 and 33L Departure Usage

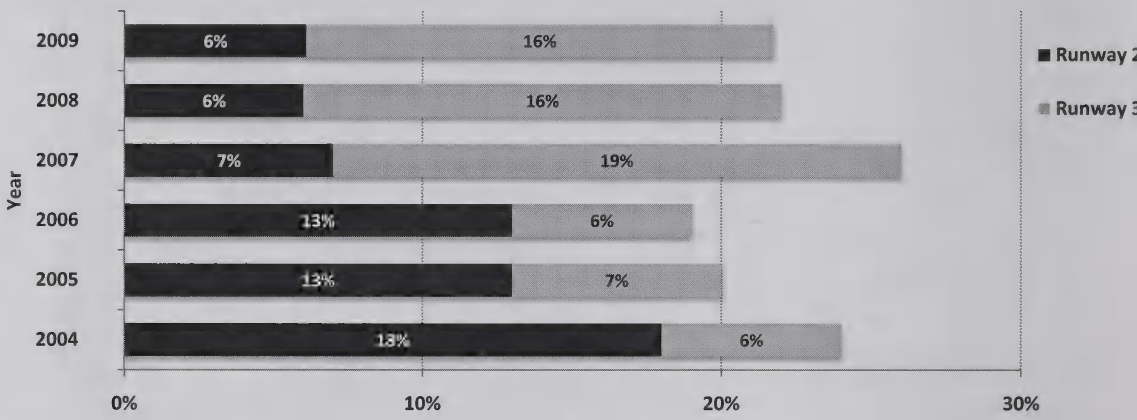


Table 6-4 presents consolidated annual runway use by jets. The 2009 radar data used for this analysis was obtained from the new NOMS system at Massport; this is the first year this data has been used for modeling. Prior to 2009, radar data have been analyzed with Massport's PREFLIGHT™ software. Prior to 2001, data were derived from Massport's original noise monitoring system, supplemented with field records.

Table 6-4 Summary of Annual Jet Aircraft Runway Use[1]

	Runway									
	4L	4R	9	14[2]	15R	22L	22R	27	32[2]	33L
2004										
Departures	0%	5%	34%	NA	10%	4%	24%	18%	-	6%
Arrivals	6%	34%	0%	-	1%	12%	0%	24%	NA	23%
2005										
Departures	0%	5%	36%	NA	7%	1%	31%	13%	-	7%
Arrivals	8%	33%	0%	-	1%	11%	0%	29%	NA	17%
2006										
Departures	0%	4%	33%	<0.1%	3%	1%	40%	13%	-	6%
Arrivals	7%	29%	0%	-	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	<0.1%	4%	1%	33%	7%	-	19%
Arrivals	5%	31%	0%	-	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<0.1%	3%	<0.1%	36%	6%	-	16%
Arrivals	6%	30%	0%	-	2%	17%	0%	33%	2%	11%
2009										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%

Source: Massport Noise Office and HMMH 2010.
Notes: The data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.
1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*
2 Runway 14-32 opened in late November, 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).
NA Runway was not available.

Preferential Runway Advisory System

Developed in 1982 and enhanced in 1990 and subsequent years, the Preferential Runway Advisory System (PRAS) is a set of short-term and long-term runway use goals that includes the use of a computer program that recommends to FAA air traffic controllers, runway configurations that will meet weather and demand requirements and provide an equitable distribution of the Airport's noise impacts on surrounding communities. The two primary objectives of the PRAS goals are to distribute noise in on an annual basis, and to provide short-term relief from continuous operations over the same neighborhoods at the ends of the runways.

PRAS Compliance

Under the PRAS, each runway end has a specific annual utilization goal, defined separately for departures and arrivals. The goals are defined in terms of effective usage, which applies a factor of 10 to nighttime (10:00 PM to

7:00 AM) operations, equivalent to increasing nighttime exposure by 10 dB so that a change in effective utilization is roughly proportional to the change in DNL.

In February of 2004, the FAA upgraded to the STARS and IDS5 radar during the consolidation of the Boston TRACON at the new facility in Merrimack, NH.[8] As a result of this upgrade, a shutdown of the PRAS system computer was necessary. Updated PRAS software was installed in 2007. Technical difficulties related to processing input from the FAA's ADS-V system have continued. Phase Three of the on-going Boston Logan Airport Noise Study (BLANS) will evaluate whether or not to begin use of the PRAS system.

Table 6-5 provides a comparison of effective runway use in 2009 to that of 2008, and to the PRAS goals. The 2009 utilizations shown in bold indicate improvements toward the goals for all runways. The effective jet runway use in 2009 made progress towards the PRAS goals, with arrivals and departures on most runways. The arrival percentages for Runways 15R, 22L, 22R, 27, and 33L all moved closer to the PRAS goals and for departures, Runways 9, 15R, 22L, 22R, 27, and 33L all moved closer to the PRAS goals.

Table 6-5 Effective Jet Aircraft Runway Use in Comparison to PRAS Goals

	PRAS Effective Usage Goals		2008 Effective Usage		2009 Effective Usage	
Runway End	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
4R/L	21.1%	5.6%	**30.2%**	**4.6%**	32.8%	6.3%
9	0.0%	13.3%	0.0%	29.3%	0.0%	**29.2%**
15R	8.4%	23.3%	**1.4%**	7.3%	**2.5%**	**7.7%**
22L/R	6.5%	28.0%	22.5%	35.4%	**21.7%**	**33.6%**
27	21.7%	17.9%	**25.9%**	7.1%	**20.9%**	**8.0%**
33L	42.3%	11.9%	**19.4%**	**16.2%**	**21.5%**	**15.2%**
14[1]	NA	NA	-	<0.1%	-	<0.1%
32[1]	NA	NA	0.7%	-	0.6%	-

Source: Massport Noise Office and HMMH 2010.

Notes: PRAS goals are stated in terms of effective jet operations which exclude non-jet flights, but which multiply each nighttime (10:00 PM to 7:00 AM) operation by a factor of 10. PRAS goals have not yet been established for Runways 14 and 32.

Bold text indicates runways use that were close to PRAS goals.

1 Runway 14-32 opened in late November, 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).

Flight Tracks

Starting in 2004, the software package RealContours™ was used to develop the INM inputs. This new system uses every available radar track for modeling which has suitable data. This allows Massport to take into account runway closures and/or temporary airspace changes. Instead of using representative model tracks, RealContours™ converts each radar track to an INM model track and then models the scaled operation on that track. This method provides a one-to-one correspondence of radar tracks to model tracks and ensures that the lateral and vertical dispersion of aircraft types are consistent with the radar data. The software package

8 Standard Terminal Automation Replacement System (STARS) is FAA's replacement radar equipment and software for terminal approach control (TRACON) and tower facilities. Integrated Information Display & Dissemination System version 5 (IDS5) is an advanced information management toolset designed for air traffic control by Systems Atlanta, which works with the STARS system.

RealProfiles™ was used to develop a profile for each flight track departing from and arriving to each runway end to ensure that the altitude profiles represented as accurately as possible the aircraft's performance during arrival or departure. This use of special profiles improves the accuracy of each aircraft's modeled altitude over surrounding communities.

For the *2009 EDR*, 332,027 flight tracks were modeled to calculate the noise levels surrounding Logan Airport. Figures 6-7 through 6-12 provide a representative sample of flight tracks used with RealContours™ to develop the 2009 contours.[9] The figures show arrivals and departures separately for each of three aircraft categories: air carrier jets, regional jets, and non-jets.

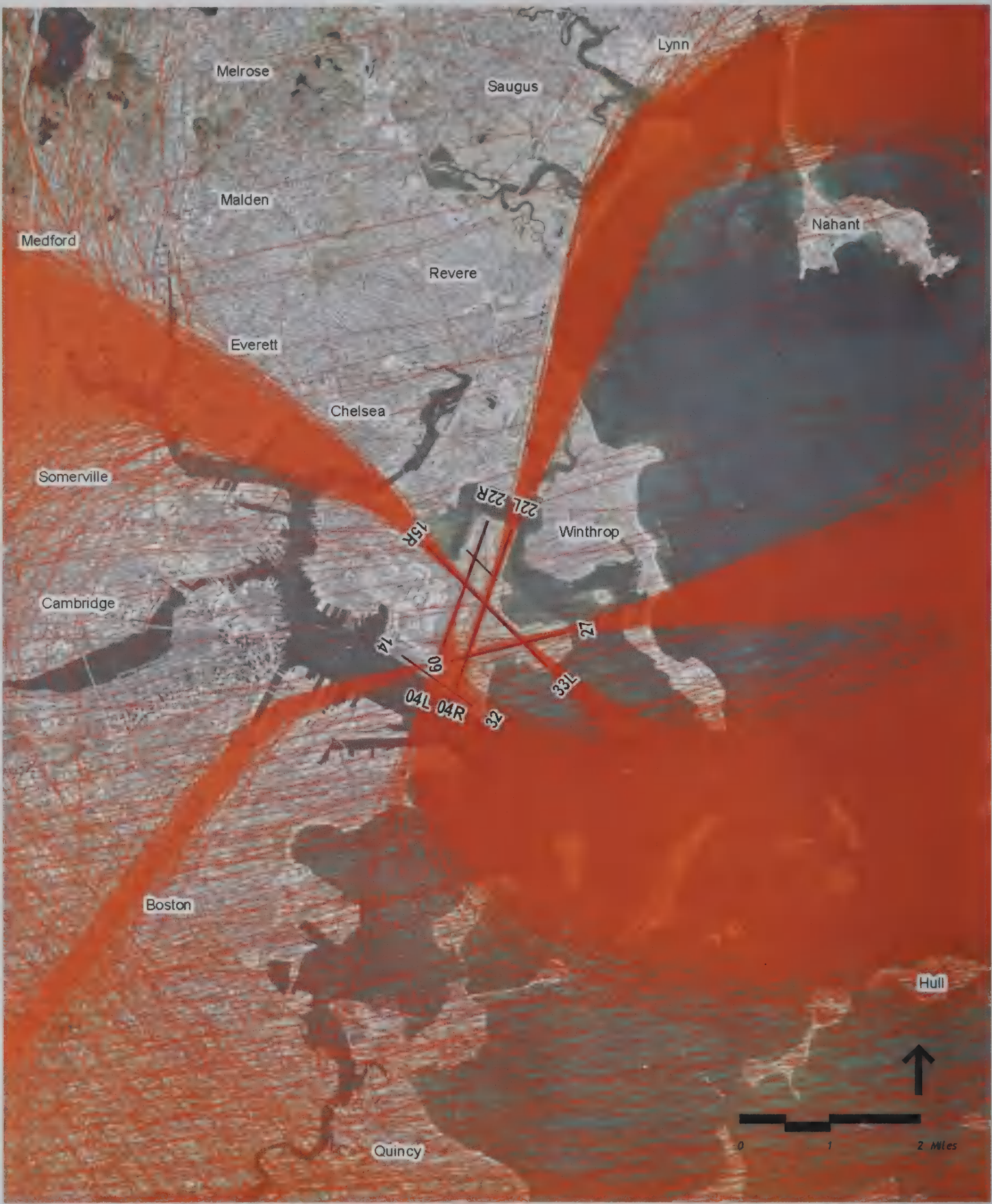
- Figure 6-7 displays air carrier jet departures following the recommended departure routes. The Runway 27 WYLYY Seven RNAV[10] departure procedure is evident in this graphic as the departures from Runway 27 do not show the dispersion that is seen at the other runways.
- Figure 6-8 displays air carrier jet arrivals. This graphic displays the east downwind configuration which the air carrier arrivals utilize to line up on final approach to the runways thus avoiding populated areas to the west of the Airport.
- Figure 6-9 displays the regional jet departures following the recommended departure routes with flights remaining north of the Hull peninsula and passing over the Nahant Causeway.
- Figure 6-10 displays the regional jet arrivals which utilize both east and west sides of the Airport for arrivals. Arrivals to Runway 32 are also displayed on this graphic.
- Figure 6-11 displays the non-jet departures which tend to turn early off the runways and do not follow the jet departure routes. Non-jet departures from Runways 4L, 22R, 33L, and 27 are allowed to turn over populated areas whereas the jet aircraft are not. This also keeps the non-jet aircraft out of the jet departure paths allowing for efficient jet departures.
- Figure 6-12 displays the non-jet arrivals and includes the harbor route for non-jet aircraft arriving to Runway 4L. The graphic also displays the non-jet arrivals to Runways 22R and 33R in addition to the runways which also accommodate jets.

Meteorological Data

The INM has several settings that reflect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average temperature, barometric pressure, and relative humidity at the Airport. Massport obtained weather data for 2009 from the National Climatic Data Center (NCDC). Average daily values for each of the settings were used in the development of the 2009 noise conditions. The average conditions for each day allowed the modeling system used by Massport to develop performance profiles based on each days conditions and allowed the INM model to use each day's conditions to affect the propagation of noise. This is an improvement over previous years (prior to 2008) which only used the annual average value to model these conditions.

9 Runway use from each month was developed and compared to the annual runway use information. October 2009 provided the closest match to annual results.

10 Area Navigation (RNAV) - RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or spaced-based navigation aids, or within the limits of the capability of aircraft self-contained systems, or a combination of both capabilities.

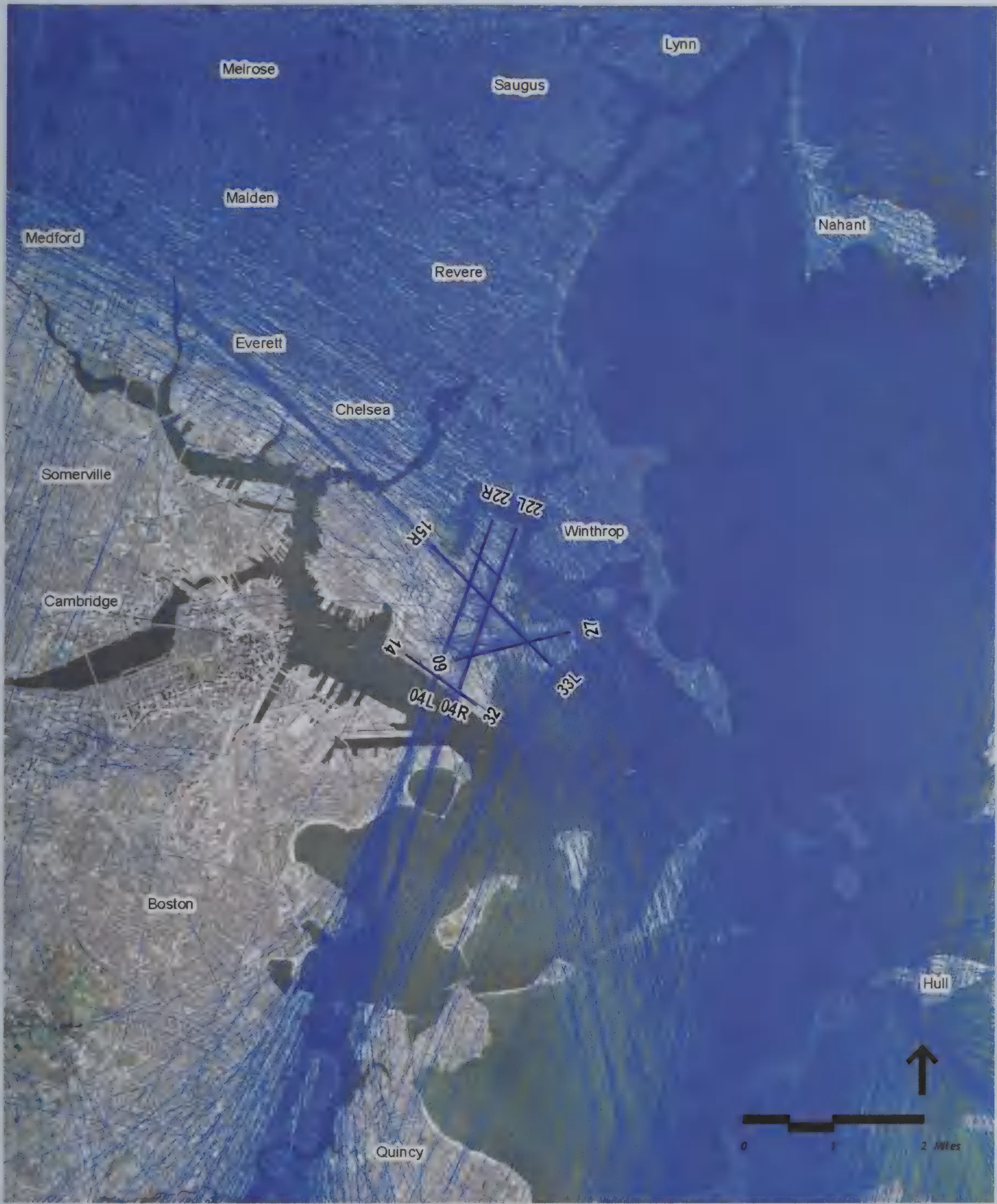


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.

RealContours ™ Air Carrier Departure Tracks (October 2009)

Figure 6-7

Departure Flight Tracks

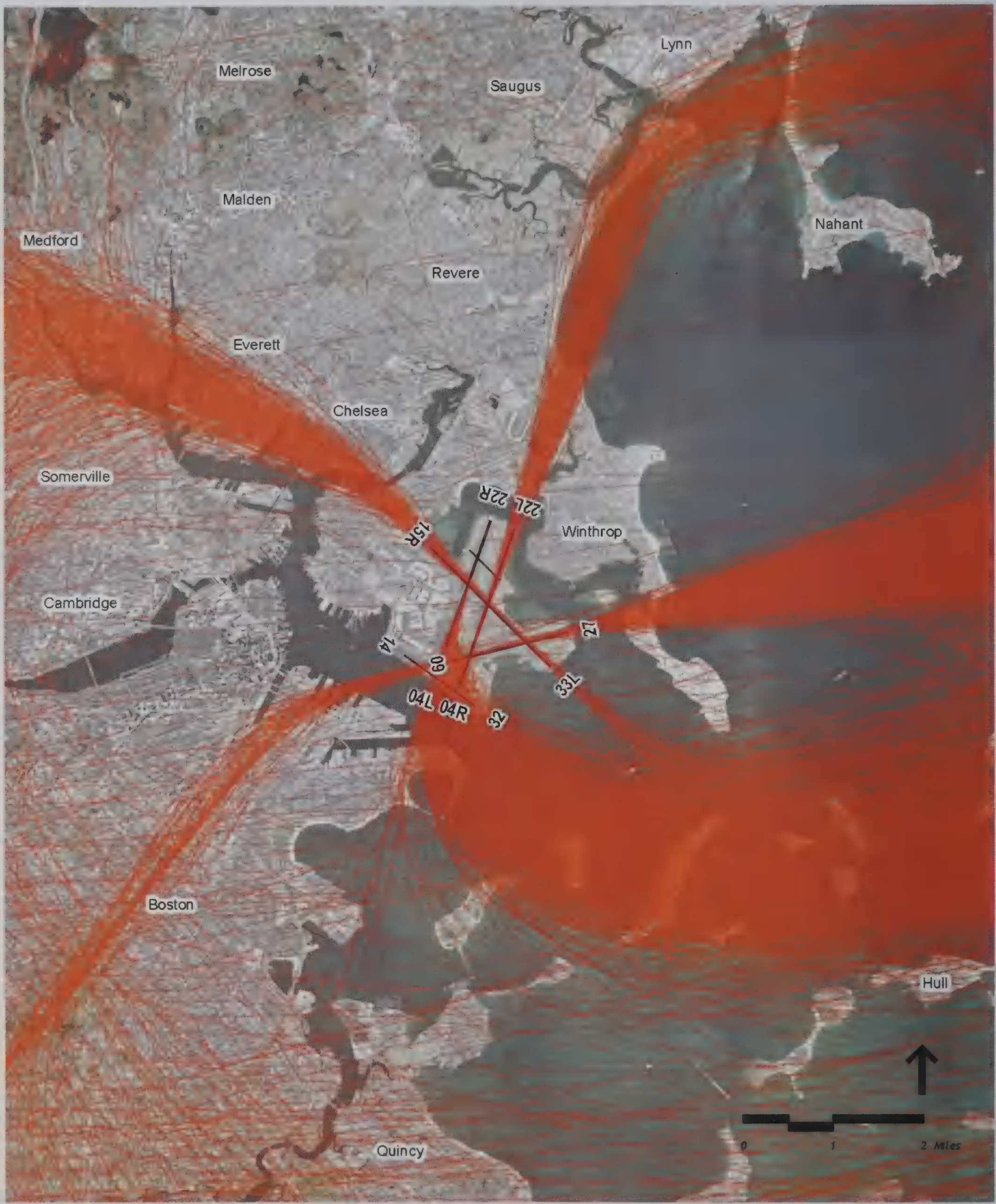


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Air Carrier Arrival Tracks (October 2009)

Figure 6-8

Arrival Flight Tracks

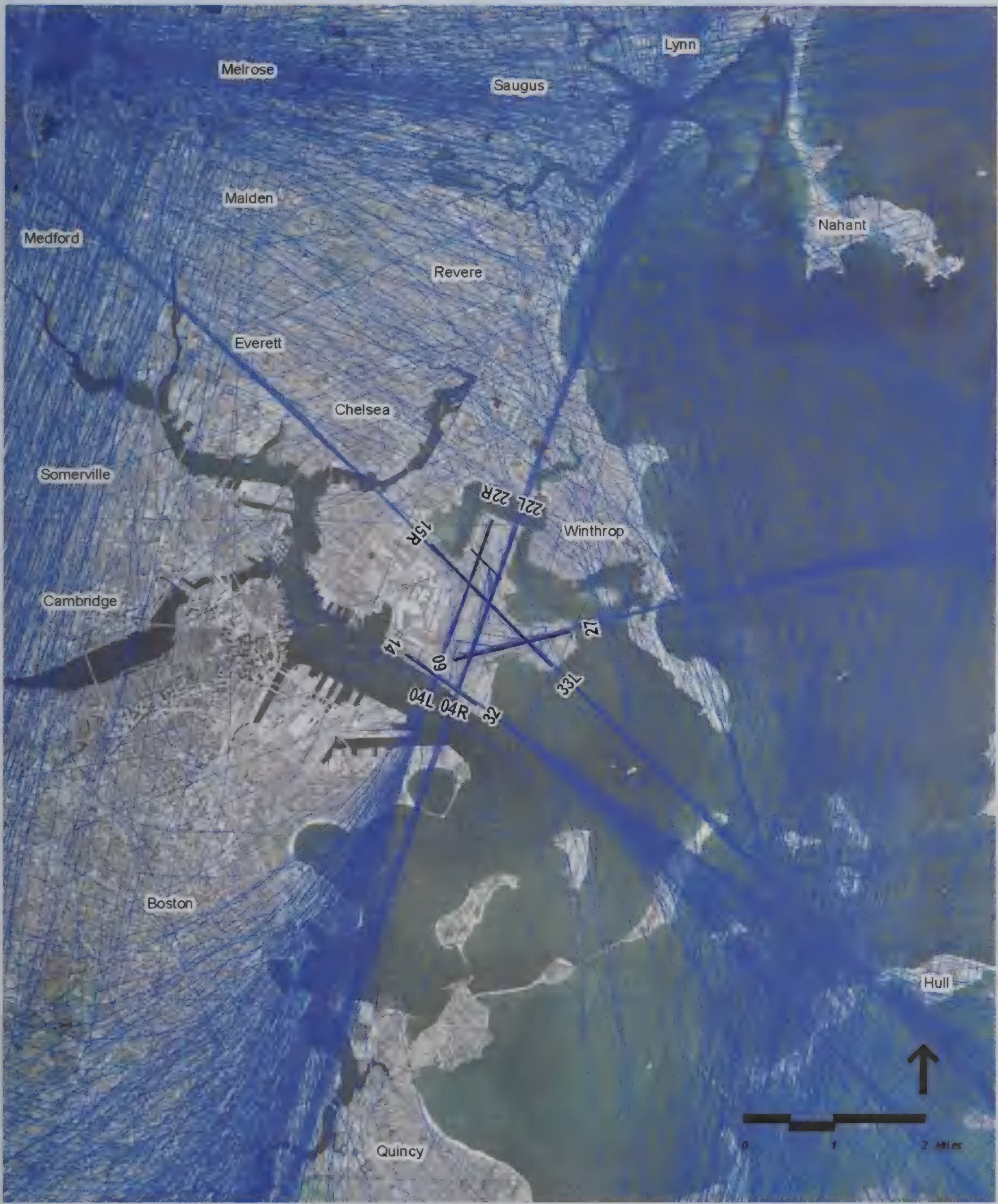


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Regional Jet Departure Tracks (October 2009)

Figure 6-9

Departure Flight Tracks

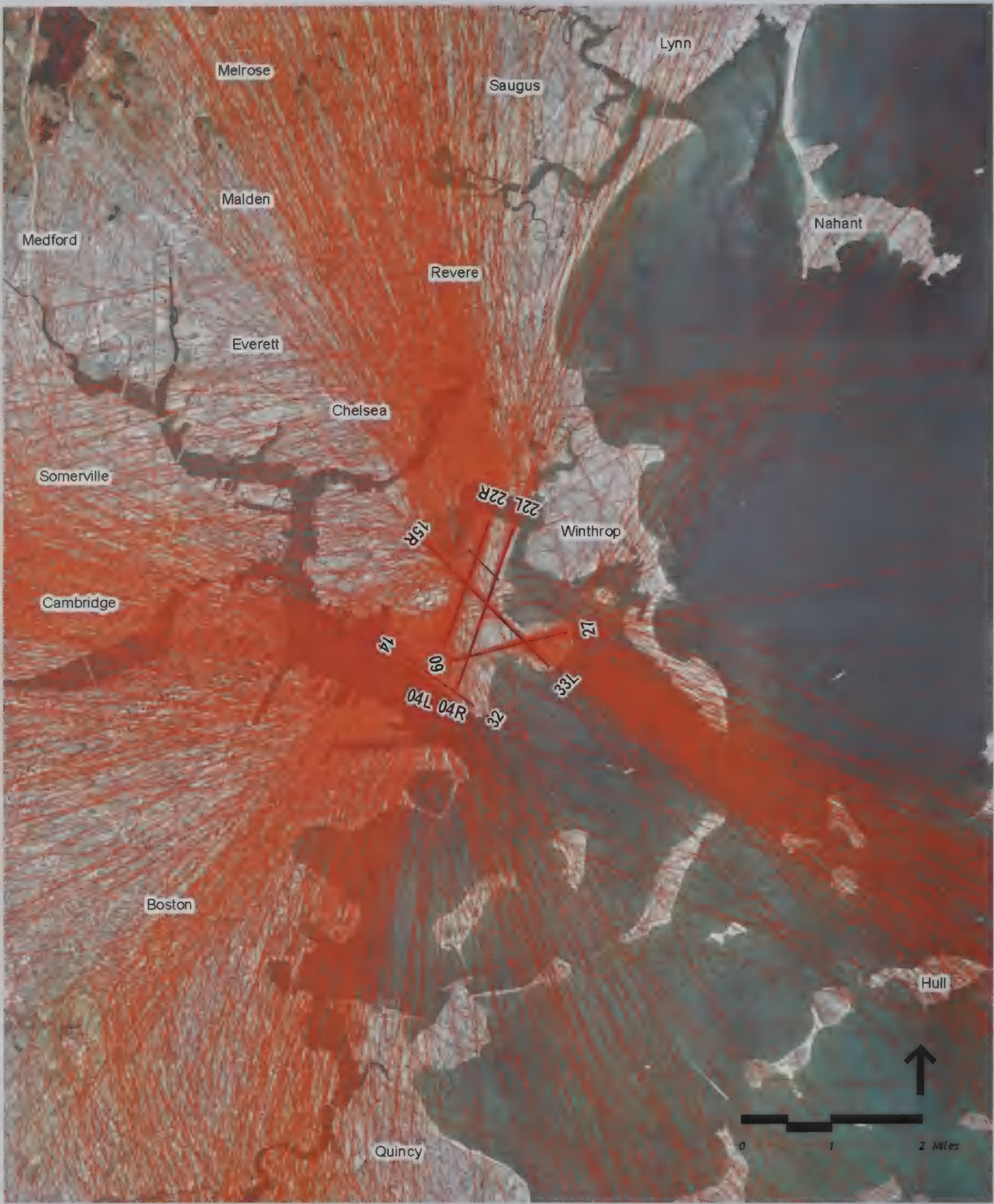


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Regional Jet Arrival Tracks (October 2009)

Figure 6-10

Arrival Flight Tracks

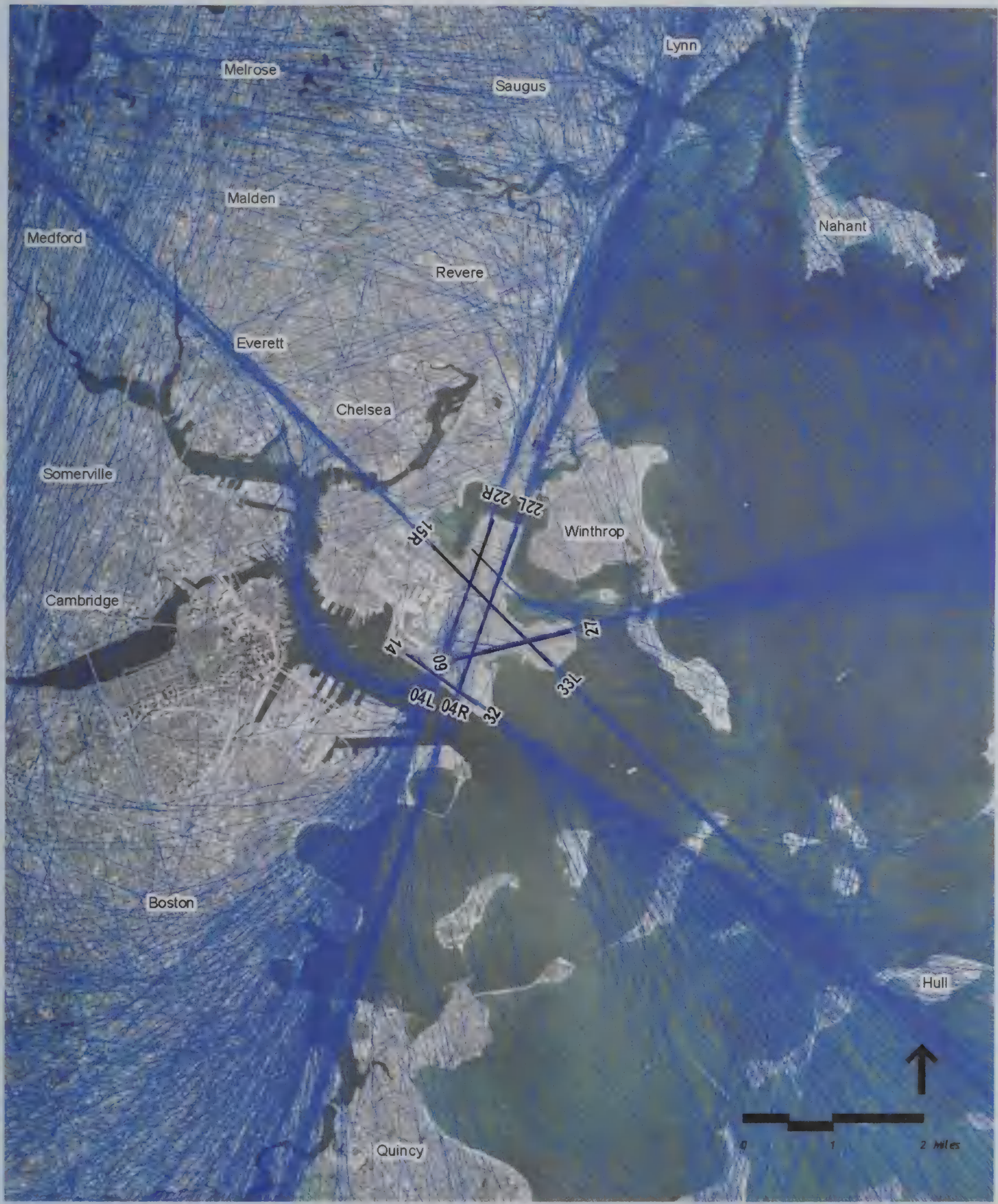


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours ™ Non-Jet Departure Tracks (October 2009)

Figure 6-11

Departure Flight Tracks



Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Non-Jet Arrival Tracks (October 2009)

Figure 6-12

Arrival Flight Tracks

2009 Noise Levels

Day-Night Noise Contours for 2009

The 2009 DNL contours were prepared using FAA's INMv7.0b and are shown in Figure 6-13 for DNL values of 60, 65, 70, and 75 dB. Figure 6-14 is a closer view of the airport and compares the 65 DNL contours for 2009 and 2008. Differences between these contours are a result of the operational differences (reduced operations, changes in fleet mix, and changes in runway use) from one year to the next. Both the 2008 and 2009 contours include the FAA-approved adjustments for over-water sound propagation and hill effects in Orient Heights, unique to Logan Airport.

In general, the 2009 DNL 65 dB contour was smaller in most locations surrounding the Airport. Fewer departures from Runway 33L reduced the noise contours in East Boston which have a large effect on impacted population counts. The decreases in the DNL 65 dB contour are mainly attributable to the reduction in operations from 2008 to 2009. Departures from Runways 4R and 15R increased in 2009 along with arrivals to Runways 4R and 33L which caused the increase in the 65 DNL contour over Revere, South Boston, and Boston Harbor. These changes from 2008 are primarily due to the extended weekend closures of Runway 9-27 for resurfacing during July to September 2009 resulting in departures shifting to Runways 4R and 15R and arrivals to Runways 4R and 33L. These increases were primarily over the water and did not affect residential areas.

The comparisons between the 2009 and the 2008 contours were both based on the INMv7.0b generated contours (Figure 6-14). The 65 dB DNL contour is within populated areas already sound insulated by Massport (refer to the Noise Abatement discussion presented later on in this chapter).

Population Impact Assessment

Population counts within selected 5 dB increments of exposure are reported each year to indicate how Logan Airport's noise environment changes over time. Population counts for 2009 are shown in Table 6-6 by community and are compared to previous years. Population counts since 2001 are based on U.S. Census data for 2000. Both the FAA and the U.S. Department of Housing and Urban Development (HUD) consider DNL exposure levels above 65 dB to be incompatible with residential land use. Table 6-6 compares impacted populations each year, using the latest INM results. The noise analysis is based upon the most recently FAA-approved INM (INMv7.0b). Table 6-7 contains two sets of results for 2008 due to the improvements of the FAA noise model. The INMv7.0a results were presented in the *2008 EDR* and are provided here so that the differences in the modeling between INMv7.0a and INMv7.0b can be seen. Table 6-7 provides an additional breakdown of the estimated population in East Boston and South Boston residing within the 65 dB DNL contour.

Source: HMMH, Inc. 2010, Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

2009 DNL Contour (INM 7.0b)

60-75 DNL Contours for 2009 Operations Using INM 7.0b

Figure 6-13

Source: HMMH, Inc. 2010, Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Massachusetts Executive Office of Energy and Environmental Affairs

2009 DNL Contour (INM 7.0b)
2008 DNL Contour (INM 7.0b)

Comparison of the 65 dB DNL Contours for 2008 and 2009 Operations Using INM 7.0b

Figure 6-14

Table 6-6 Noise-exposed Population by Community[1]

Boston

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL	Census Base
2004	0	65	192	4,142[3]	4,399[3]	2000
2005	0	65	104	2,020[3]	2,189[3]	2000
2006	0	65	99	1,054[3]	1,218[3]	2000
2007	0	0	169	4,094	4,263	2000
2008 (INMv7.0a)	0	0	0	2,376	2,376	2000
2008 (INMv7.0b)	0	5	0	3,487	3,492	2000
2009 (INMv7.0b)	0	5	67	937	1,009	2000

Revere

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL
2004	0	0	82	2,969	3,051
2005	0	0	82	2,540	2,622
2006	0	0	82	2,540	2,622
2007	0	0	0	2,450	2,450
2008 (INMv7.0a)	0	0	0	2,434	2,434
2008 (INMv7.0b)	0	0	0	2,434	2,434
2009 (INMv7.0b)	0	0	0	2,512	2,512

Chelsea

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL	Census Base
2004	0	0	0	0	0	2000
2005	0	0	0	0	0	2000
2006	0	0	0	0	0	2000
2007	0	0	0	0	0	2000
2008 (INMv7.0a)	0	0	0	0	0	2000
2008 (INMv7.0b)	0	0	0	0	0	2000
2009 (INMv7.0b)	0	0	0	0	0	2000

Winthrop

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL
2004	0	2	337	1,649	1,988
2005	0	39	347	1,280	1,666
2006	0	39	416	1,288	1,743
2007	0	0	247	1,139	1,386
2008 (INMv7.0a)	0	0	244	909	1,153
2008 (INMv7.0b)	0	0	244	1,409	1,653
2009 (INMv7.0b)	0	0	171	643	814

Everett

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL	Census Base
2004	0	0	0	0	0	2000
2005	0	0	0	0	0	2000
2006	0	0	0	0	0	2000
2007	0	0	0	0	0	2000
2008 (INMv7.0a)	0	0	0	0	0	2000
2008 (INMv7.0b)	0	0	0	0	0	2000
2009 (INMv7.0b)	0	0	0	0	0	2000

All Communities

Year	80+ DNL	75-80 DNL	70-75 DNL	65[2]-70 DNL	Total (65+)[2] DNL
2004	0	67	611	8,760[3]	9,438[3]
2005	0	104	533	5,840[3]	6,477[3]
2006	0	104	597	4,882[3]	5,583[3]
2007	0	0	416	7,683	8,099
2008 (INMv7.0a)	0	5	244	5,719	5,968
2008 (INMv7.0b)	0	5	244	7,330	7,579
2009 (INMv7.0b)	0	5	238	4,092	4,335

Source: HMMH 2010, Massport.

Notes: Population counts for 2004 through 2009 are based on the 2000 U.S. Census block data and the contours are from the RealContours™ system

1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*

2 65 dB DNL is the federally-defined noise criterion used as a guideline to identify when residential land use is considered incompatible with aircraft noise.

3 These values reflect the effect of the FAA-approved terrain adjustment in Orient Heights.

Table 6-7 Estimated Population within 65 dB[1] DNL Contour[2]

	2000 Census Base							Change	
	2004	2005	2006 (INMv6.2a)	2007 (INMv7.0a)	2008 (INMv7.0a)	2008 (INMv7.0b)	2009 (INMv7.0b)	Model Changes (2008 INMv7.0a to 2008 INMv7.0b)	Total Changes (2008 INMv7.0a to 2009 INMv7.0b)
Boston									
East Boston	4,399	2,155	1,184	4,263	2,376	3,492	1,009	1,116	-2,483
South Boston	0	34	34	0	0	0	0	0	0
Boston total	**4,399**[3]	**2,189**[3]	**1,218**[3]	**4,263**	**2,376**	**3,492**	**1,009**	**1,116**	**-2,483**
Chelsea	0	0	0	0	0	0	0	0	0
Revere	3,051	2,622	2,622	2,450	2,434	2,434	2,512	0	78
Winthrop	1,988	1,666	1,743	1,386	1,153	1,653	814	500	-839
Everett	0	0	0	0	0	0	0	0	0
All Communities	**9,438**	**6,477**	**5,583**	**8,099**	**5,968**	**7,579**	**4,335**	**1,611**	**-3,244**

Source: HMMH 2010, Massport.
Notes: Population counts for 2004 through 2009 are based on the 2000 U.S. Census data.
2004 through 2009 results are from the RealContours™ system.
1 65 dB DNL is the federally-defined noise criterion used as a guideline to identify where residential land use is considered incompatible with aircraft noise.
2 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*
3 These values reflect the effect of the FAA-approved terrain adjustment in Orient Heights.

The changes in 2008 in Tables 6-6 and 6-7 between the two versions of the INM are due to FAA's refinement of the Integrated Noise Model and, in particular, the use of an updated aircraft database. For 2008, using the INMv7.0b updated aircraft database in the FAA noise model resulted in modeled increases of approximately 0.7 to 1.2 dB in the East Boston and Winthrop areas. The contour traverses these heavily populated areas resulting in the population estimated within 65 dB DNL contour to increase from 2,376 in East Boston to 3,492, an increase of 1,116 people. The improved aircraft database included updated data for the Airbus fleet and the addition of several aircraft jet and non-jet types. The most significant addition is the CRJ9-ER aircraft which was substituted for an A319 aircraft in the previous INM (INMv7.0a) but now has its own aircraft type. The CRJ9-ER aircraft are similar in noise level to the A319 aircraft but with different performance profiles, which resulted in changes to the noise contours. The Piper 42 aircraft was added to the database and is 3 dB louder than the turboprop substitution used in the INMv7.0a modeling. The Dornier 328 aircraft was also added to the database and is at least 6 dB louder than the turboprop substitution that was used in the INMv7.0a modeling.

The differences in affected population between 2008 and 2009 in Tables 6-6 and 6-7 are due to the decrease in the number of operations, as well as fleet mix and runway use changes. The decrease in operations and reduced use of Runway 33L for departures led to a decrease in the total number of people living within the 65 dB DNL contour from 5,968 to 4,335, a decrease of 1,633 people (27 percent). The largest decrease was over East Boston which had 2,483 fewer people exposed to noise levels DNL 65 dB or greater when compared to 2008.

Within the DNL 70 dB contour, the total population exposed to noise levels between DNL 70 to 75 was down slightly compared to 2008. In Boston, there was an increase of 67 people inside the DNL 70 dB contour when compared to 2008; in Winthrop, there was a decrease of 73 people within the DNL 70 dB contour when compared to 2008.

Comparing Measured and Modeled Noise Levels

When changes in noise exposure are predicted by the INM, it is important to substantiate these modeled findings with actual noise measurements, such as those taken under Massport's permanent noise monitoring system. Massport's system continuously measures the noise levels at each of 30 microphone locations around the Airport and environs, as shown in Figure 6-15. During normal operation, noise monitors at the microphone locations measure noise exposure levels as well as a variety of metrics associated with individual noise events that exceed preset threshold sound levels. Noise monitoring data are transmitted back to Massport's Noise Office, where daily DNL values and other noise metrics are computed for each location and summarized in various reports.

This *2009 EDR* compares the measured annual average DNL values from the monitors to INM-computed values of DNL at each of the specific noise monitor sites to check for reasonableness. Many sites produced small differences between measurements and predictions, particularly as adjustments were incorporated into the modeling process to account for the over-water sound propagation and hill effects. However, results at more distant locations have often produced significant differences of 10 dB or more, especially at measurement sites where DNL values were often less than 60 dB. In 2009, with the Airport's new noise measurement equipment and new monitoring system and its ability to correlate measured noise events with individual flight tracks, combined with the improvements in the INM database, differences between measured and modeled values have narrowed from the values even more than reported in previous EDRs.

Several factors have resulted in better agreement between measured versus modeled levels. For the *2009 EDR*, flight track data from the new monitoring system, with more accurate data, was used for the modeling. This same track data is used for the measured aircraft event correlation. While this data has been used for the event correlation since 2007, 2009 is the first year the data is available for the modeling. The NOMS system was not operationally accepted until 2009 when all required testing was completed.

Aircraft altitude is a second factor that contributes to the differences between measured and modeled DNL values (especially at the more-distant noise monitoring sites). Typical noise modeling uses distance from origin to destination to determine the appropriate climb profile for an aircraft; however, many aircraft climb more slowly than the standard profiles would suggest, especially if the pilot must make a turn shortly after takeoff. Thus, beginning with the *2002 EDR*, Massport enhanced the modeling process by using radar data from its monitoring system to determine the best available climb profile (see *Appendix H, Noise Abatement*). RealProfiles™ further enhances this process by modeling the actual climb profile instead of selecting the best fit among a standard set. This technique resulted in modeling lower altitudes over many of the farther out monitoring sites, which is a better reflection of reality, and further reduced the differences between measured and modeled sound levels at those locations.

Finally, latitudes and longitudes of each measurement site were verified by survey and their exact coordinates entered into the INM. These improvements in modeling techniques are now fully integrated into the measured-versus-modeled (INM) comparisons that follow.

Figure 6-15 Noise Monitor Locations

Table 6-8 compares the measured 2008 DNL values at each location to the measured 2009 DNL values. Measured sound levels decreased at most locations due to the reductions in operations in 2009. The increases were due mostly to runway use changes but the change at Site 17 was because it was not operational for much of 2008 but was operational for all of 2009. Table 6-9 compares the measured 2009 DNL value at each measurement site to the modeled 2009 DNL value.

Table 6-8 Measured Versus Measured - Comparison of Measured DNL Values From 2009 to 2008

Location	Site	Distance from Logan Airport (miles)	2008 Measured Aircraft (DNL)	2009 Measured Aircraft (DNL)	Difference in Measured Aircraft (2008 to 2009)
South End – Andrews Street	1	3.7	54.0	52.7	(1.3)
South Boston – B and Bolton	2	2.9	52.8	54.1	1.3
South Boston – Day Blvd. near Farragut	3	2.5	60.4	60.6	0.2
Winthrop – Bayview and Grandview	4	1.6	72.5	71.5	(1.0)
Winthrop – Harborview and Faun Bar	5	1.9	64.6	64.1	(0.5)
Winthrop – Somerset near Johnson	6	0.8	64.3	60.9	(3.4)
Winthrop – Loring Road near Court	7	1.0	67.4	65.2	(2.2)
Winthrop – Morton and Amelia	8	1.6	60.3	60.8	0.5
East Boston – Bayswater near Annavoy	9	1.3	68.2	66.9	(1.3)
East Boston – Bayswater near Shawsheen	10	1.3	63.4	62.3	(1.1)
East Boston – Selma and Orient	11	1.8	57.2	56.5	(0.7)
East Boston Yacht Club	12	1.2	64.2	61.1	(3.1)
East Boston High School	13	1.9	61.8	61.3	(0.5)
East Boston – Jeffries Point Yacht Club	14	1.2	58.1	55.7	(2.4)
Chelsea – Admiral's Hill	15	2.8	61.7	61.2	(0.5)
Revere – Bradstreet and Sales	16	2.4	67.9	68.2	0.3
Revere – Carey Circle	17	5.3	50.6	60.0	9.4[1]
Nahant – U.S.C.G. Recreational Facility	18	5.9	42.3	44.1	1.8
Swampscott – Smith Lane	19	8.7	42.8	43.5	0.7
Lynn – Pond and Towns Court	20	8.4	51.7	51.3	(0.4)
Everett – Tremont near Prescott	21	4.5	51.8	52.3	0.5
Medford – Magoun near Thatcher	22	6.0	51.1	50.2	(0.9)
Dorchester – Myrtlebank near Hilltop	23	6.3	51.4	52.5	1.1
Milton – Cunningham Park near Fullers	24	8.1	48.0	49.1	1.1
Quincy – Squaw Rock Park	25	4.2	42.0	42.0	0.0
Hull – Hull High School near Channel Street	26	6.0	56.5	56.5	0.0
Roxbury – Boston Latin Academy	27	5.3	52.0	50.5	(1.5)
Jamaica Plain – Southbourne Road	28	7.7	45.5	43.2	(2.3)
Mattapan – Lewenburg School	29	7.3	39.9	41.2	1.3
East Boston – Piers Park	30	1.5	52.1	50.9	(1.2)

Notes: Changes in ( ) represent a decrease in measured noise level from 2008 to 2009. Site 17 was not operational for most of 2008. It was operational in 2009.

Table 6-9 Measured Versus Modeled - Comparison of Measured DNL Values to RealContours™-modeled DNL Values for 2009

Location	Site	Distance from Logan Airport (miles)	2009 Measured Aircraft – Only DNL	2009 Modeled RC Results INMv7.0b(DNL)[1]	2008 Difference - Measured vs. Modeled	2009 Difference - Measured vs. Modeled
South End – Andrews Street	1	3.7	52.7	52.1	(1.2)	(0.6)
South Boston – B and Bolton	2	2.9	54.1	55.8	2.7	1.7
South Boston – Day Blvd. near Farragut	3	2.5	60.6	60.1	(0.5)	(0.5)
Winthrop – Bayview and Grandview	4	1.6	71.5	72.7	0.1	1.2
Winthrop – Harborview and Faun Bar	5	1.9	64.1	63.6	0.4	(0.5)
Winthrop – Somerset near Johnson	6	0.8	60.9	61.1	(1.8)	0.2
Winthrop – Loring Road near Court	7	1.0	65.2	67.7	(0.3)	2.5
Winthrop – Morton and Amelia	8	1.6	60.8	61.2	1.7	0.4
East Boston – Bayswater near Annavoy	9	1.3	66.9	70.0	2.6	3.1
East Boston – Bayswater near Shawsheen	10	1.3	62.3	61.6	(1.2)	(0.7)
East Boston – Selma and Orient[2]	11[2]	1.8	56.5	56.7	0.4	0.2
East Boston Yacht Club	12	1.2	61.1	66.8	3.9	5.7
East Boston High School	13	1.9	61.3	61.7	1.1	0.4
East Boston – Jeffries Point Yacht Club	14	1.2	55.7	55.3	(1.8)	(0.4)
Chelsea – Admiral's Hill	15	2.8	61.2	60.2	(1.2)	(1.0)
Revere – Bradstreet and Sales	16	2.4	68.2	67.9	(1.5)	(0.3)
Revere – Carey Circle	17	5.3	60.0	58.7	8.0	(1.3)
Nahant – U.S.C.G. Recreational Facility	18	5.9	44.1	45.6	3.2	1.5
Swampscott – Smith Lane	19	8.7	43.5	46.5	3.8	3.0
Lynn – Pond and Towns Court	20	8.4	51.3	50.5	(0.6)	(0.8)
Everett – Tremont near Prescott	21	4.5	52.3	53.3	1.1	1.0
Medford – Magoun near Thatcher	22	6.0	50.2	50.9	0.6	0.7
Dorchester – Myrtlebank near Hilltop	23	6.3	52.5	53.3	2.4	0.8
Milton – Cunningham Park near Fullers	24	8.1	49.1	52.5	4.0	3.4
Quincy – Squaw Rock Park	25	4.2	42.0	46.4	5.0	4.4
Hull – Hull High School near Channel Street	26	6.0	56.5	55.2	(0.8)	(1.3)
Roxbury – Boston Latin Academy	27	5.3	50.5	50.7	(1.3)	0.2
Jamaica Plain – Southbourne Road	28	7.7	43.2	46.9	1.7	3.7
Mattapan – Lewenburg School	29	7.3	41.2	45.6	5.5	4.4
East Boston – Piers Park	30	1.5	50.9	52.8	1.8	1.9

Note: 2008 and 2009 Modeled results were computed for the whole year.
1 INMv7.0b with adjusted database. (Database modifications as described in the *Logan Airport 1994/1995 Generic Environmental Impact Report*).
2 Includes FAA-approved terrain adjustment modifying normal INMv7.0b result for Site 11.
NA Not available.

The differences between the measured and modeled in 2009 are presented and compared to the measured versus modeled differences from 2008. Using RealContours™, Massport is able to compute the modeled DNL for exactly the same periods for which the noise monitoring system was collecting data at each site. As shown in Table 6-9, approximately half of the sites experienced improvements that narrowed the difference between the measured and modeled values. The two sites in Winthrop off the end of Runway 9 both match well with measured values (within 1.2 dB).

Supplemental Metrics

To better describe the noise environment, this *2009 EDR* includes supplemental noise metrics: cumulative noise index, dwell and persistence, and times above a noise threshold.

Cumulative Noise Index

Massport reports total annual fleet noise at Logan Airport, defined in the Logan Airport Noise Rules by a metric referred to as the CNI. The CNI is a single number representing the sum of the entire set of single-event noise levels experienced at the Airport over a full year of operation, weighted similarly to DNL so that activity occurring at night is penalized by adding an extra 10 dB to each event. This penalty is mathematically equivalent to multiplying the number of nighttime events by each aircraft by a factor of 10.

The Logan Airport Noise Rules define CNI in terms of EPNdB and require that the index be computed for the fleet of commercial aircraft operating at Logan Airport throughout the year. In addition, in EDRs and ESPRs, Massport reports partial CNI values of noise at Logan Airport, so that various subsets of the fleet (cargo, night operations, passenger jets, etc.) are identified.

The Noise Rules, adopted by Massport following public hearings held in February 1986, established a CNI limit of 156.5 EPNdB. The CNI generally has decreased since 1990, remaining below that cap, and typical changes from one year to the next have been within a few tenths of a dB. The 2009 CNI of 152.3 EPNdB represents a 0.6 dB decrease from 2008 which reverses the trend of slight increases for the last few years. The CNI decreased compared to 2008 in all categories. The 2009 CNI remained well below the cap of 156.5 EPNdB.

Partial CNI Calculations
Partial CNI values were obtained by summing the noise energy from particular segments of Logan Airport's total operations. They are useful for identifying the greatest contributors to overall noise. As shown in Table 6-10, the sectors of the fleet with the highest numbers of partial CNI indicate a greater contribution to total noise.

Table 6-10 also indicates that:

- Passenger jets contributed approximately 5.2 dB more noise to the total exposure in 2009 than cargo aircraft.
- Nighttime operations continued to contribute more noise than daytime activity, and nighttime flights by air carriers contributed more noise than nighttime cargo operations.

- Daytime cargo decreased 0.6 dB with nighttime cargo only decreasing by 0.1 dB because most cargo operations occur during nighttime hours.
- Cargo noise has continued to decrease slightly each year as the major carriers improve their fleets.

Table 6-10 Cumulative Noise Index (EPNdB)[1]

	Logan Airport CNI Cap – 156.5 EPNdB						
	2004	2005	2006	2007	2008	2009	Change (2008-2009)
Full CNI (Entire Commercial Jet Fleet)	**153.4**	**153.2**	**152.6**	**152.7**	**152.9**	**152.3**	**-0.6**
Total Passenger Jets	152.2	152.1	151.4	151.5	151.9	151.1	-0.8
Total Cargo Jets	147.0	146.6	146.5	146.4	146.1	145.9	-0.2
Total Daytime	148.5	148.2	147.5	147.2	147.6	147.1	-0.5
Total Nighttime	151.7	151.6	151.0	151.2	151.4	150.7	-0.7
Total Stage 2 Jets	118.1	NA	NA	NA	NA	NA	NA
Total Stage 3 Jets	153.4	153.2	152.6	152.7	152.9	152.3	-0.6
Daytime Stage 2	109.4	NA	NA	NA	NA	NA	NA
Nighttime Stage 2	117.5	NA	NA	NA	NA	NA	NA
Daytime Stage 3	148.5	148.2	147.5	147.2	147.6	147.1	-0.5
Nighttime Stage 3	151.7	151.6	151.0	151.2	151.4	150.7	-0.7
Passenger Jet Stage 2	NA	NA	NA	NA	NA	NA	NA
Passenger Jet Stage 3	152.2	152.1	151.4	151.5	151.9	151.1	-0.8
Cargo Jet Stage 2	118.1	NA	NA	NA	NA	NA	NA
Cargo Jet Stage 3	147.0	146.6	146.5	146.4	146.1	145.9	-0.2
Daytime Passenger	148.2	147.9	147.2	146.9	147.3	146.8	-0.5
Nighttime Passenger	150.0	150.1	149.3	149.7	150.0	149.1	-0.9
Daytime Cargo	135.7	135.8	135.5	135.8	135.8	135.2	-0.6
Nighttime Cargo	146.7	146.2	146.1	146.0	145.6	145.5	-0.1
Daytime Passenger Stage 2	NA	NA	NA	NA	NA	NA	NA
Daytime Passenger Stage 3	148.2	147.9	147.2	146.9	147.3	146.8	-0.5
Nighttime Passenger Stage 2	NA	NA	NA	NA	NA	NA	NA
Nighttime Passenger Stage 3	150.0	150.1	149.3	149.7	150.0	149.1	-0.9
Daytime Cargo Stage 2	109.4	NA	NA	NA	NA	NA	NA
Daytime Cargo Stage 3	135.7	135.8	135.5	135.8	135.8	135.2	-0.6
Nighttime Cargo Stage 2	117.5	NA	NA	NA	NA	NA	NA
Nighttime Cargo Stage 3	146.7	146.2	146.1	146.0	145.6	145.5	-0.1

Source: HMMH 2010
Note: General aviation and non-jet aircraft are not included in the calculation.
1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*
NA No operations by this aircraft type in the commercial fleet.

Table 6-11 Annual Operations and Partial CNI by Airline and per Operation During 2009

Airlines with more than 100 flights in 2009	2009 Operations[1]	2009 Total Airline CNI	Partial CNI per Operation 2008	Partial CNI per Operation 2009	Airline Category
Federal Express	3,107	144.3	108.0	109.4	Cargo
Airborne Express	275	133.0	107.8	108.6	Cargo
United Parcel Service	1,358	139.0	107.8	107.7	Cargo
DHL Airways	273	131.2	108.7	106.9	Cargo
Capital Cargo International	165	126.7	103.0	104.5	Cargo
TACV-Cabo Verde	211	127.5	NA	104.3	International
Air France	916	133.3	104.0	103.7	International
Miami Air	198	123.7	100.6	100.7	International
SATA International Airlines	374	126.4	98.2	100.6	International
British Airways	2,128	133.7	100.6	100.4	International
Lufthansa	1,724	132.6	100.5	100.2	International
Swiss Air	668	128.2	99.5	100.0	International
United Air Lines	17,532	142.4	101.3	100.0	Domestic
Virgin Atlantic	739	128.5	99.6	99.9	International
Continental	10,479	138.9	99.9	98.7	Domestic
Spirit Airlines	1,942	131.2	98.5	98.3	Domestic
Alaska Airlines	1,818	130.7	99.3	98.1	Domestic
Northwest	8,899	137.6	99.3	98.1	Domestic
American Airlines	25,933	142.2	99.2	98.0	Domestic
Virgin America	3,371	133.0	NA	97.7	Domestic
Compass Airlines	2,384	131.4	98.7	97.6	Regional
Alitalia	644	125.5	96.7	97.4	International
Delta Air Lines	25,129	141.4	98.0	97.4	Domestic
Southwest Airlines	2,602	131.2	NA	97.0	Domestic
ATI	268	121.2	NA	96.9	Cargo
JetBlue Airways	40,438	142.8	97.0	96.8	Domestic
Aer Lingus	1,275	127.8	97.0	96.7	International
Air Canada	3,017	131.5	96.6	96.7	International
Iberia Air Lines Of Spain	503	123.6	96.7	96.6	International
US Airways	37,992	142.0	97.6	96.2	Domestic
US Airways Express/Republic	4,897	132.7	95.4	95.8	Regional
AirTran Airways	13,665	136.7	94.9	95.3	Domestic
Midwest Express	1,649	127.3	94.2	95.1	Regional
Shuttle America Corp	2,585	128.1	93.3	94.0	Regional
Sun Country Airlines	256	117.9	NA	93.8	Regional

Table 6-11 Annual Operations and Partial CNI by Airline and per Operation During 2009 (Continued)

Airlines with more than 100 flights in 2009	2009 Operations[1]	2009 Total Airline CNI	Partial CNI per Operation 2008	Partial CNI per Operation 2009	Airline Category
Icelandair	781	121.9	93.1	93.0	International
American Eagle Airlines	21,448	135.3	92.1	92.0	Regional
Bombardier Business Jet Solutions	188	114.0	NA	91.3	Regional
Continental Express/Expressjet	1,344	122.5	90.9	91.2	Regional
Chautauqua	4,156	126.1	89.9	89.9	Regional
AWAC - US Air Express	7,590	128.3	NA	89.5	Regional
Delta Connection/Comair	17,441	131.8	90.7	89.4	Regional
Mesa Airlines	797	118.4	91.9	89.4	Regional
Pinnacle Airlines	2,341	122.7	90.0	89.0	Regional
Air Canada Jazz	5,064	126.0	89.3	89.0	Regional
Delta Connection/Atlantic SE	164	110.2	90.8	88.1	Regional

Source: Massport.

1 Operations for some carriers differ to those in *Chapter 2, Activity Levels* and *Chapter 7, Air Quality/Emissions Reduction* because this table only includes jet aircraft and not turboprops, and because it includes both scheduled and unscheduled air carriers.

NA Airline had no operations at Logan Airport.

Table 6-11 provides the number of flight operations, the resulting partial CNI by airline for 2009 and the partial CNI by operation for 2008 and 2009. The table shows the relative contribution of each airline to total CNI and reflects the contributions of individual aircraft noise levels and the frequency with which they occur. The table is sorted by the Partial CNI by operation for 2009 and shows that the major cargo operators all are at the top even with all Stage 3 aircraft since they operate primarily at night. JetBlue Airways with the largest number of operations is well below the other major airlines in part due to its use of Airbus aircraft and quieter regional jet aircraft.

Regional carriers generally contribute the least to the partial CNI per operation whereas the international carriers, which operate larger aircraft and generally have more operations at night, are just below the cargo operators in rank. The relative positions for the domestic carriers are due mainly to their fleet characteristics and number of night operations. United Airlines had 19.8 percent of its operations at night as compared to AirTran Airways, which had only 14.0 percent at night. JetBlue Airways also had high night percentages (14.3 percent) but operated a newer fleet than either American Airlines or United Airlines.

Dwell and Persistence Goals

Another measure of noise impact relates to the length of time noise impacts occur. To provide temporary relief to neighborhoods affected by regular overflights during single or multi-day periods, the PRAS Advisory Committee established two short–term goals for the system in addition to the annual goals:

- Provide relief from excessive dwell. Exceedance would be defined as more than seven hours of operations over a given area during any day between the hours of 7:00 AM and midnight.
- Provide relief from excessive persistence. Exceedance would be defined as more than 23 hours of operations over an area between 7:00 AM and midnight during a period of three consecutive days.

In contrast to the annual goals that count the number of equivalent operations on a runway, dwell and persistence are measured by the number of hours that a given location or area is subject to jet aircraft overflights. The PRAS Advisory Committee designated eight runway combinations for computing the effects of dwell and persistence on the communities. Table 6-12 shows the dwell and persistence areas by community.

As required as part of Massport's commitments to the Logan Airside Improvements Planning Project[11] this *2009 EDR* reports on noise dwell and persistence levels. Higher levels of dwell or persistence for overwater areas represent a benefit since this produces a corresponding decrease in total hours over populated areas.

Table 6-12 Representative Neighborhoods Affected by Runway Use

Runway	Representative Affected Neighborhoods
4L and 4R Arrivals	South Boston (Farragut St.), Dorchester, Quincy, Milton, Weymouth, and Braintree
32 and 33L Arrivals	Boston Harbor, Hull, Cohasset, Hingham, Scituate, and Norwell
14 and 15R Departures	Boston Harbor, Hull, Cohasset, Hingham, and Scituate
22L and 22R Departures	South Boston (Farragut Street), and Boston Harbor
27 Departures	South Boston (Fan Pier), Roxbury, Jamaica Plain, South End, West Roxbury, Roslindale, Brookline, and Hyde Park
4L and 4R Departures Plus 22L and 22R Arrivals	East Boston (Bayswater, Orient Heights), Winthrop (Court Road), Revere, and Nahant
9 Departures Plus 27 Arrivals	Winthrop (Point Shirley), and Boston Harbor
33 Departures Plus 15 Arrivals	East Boston (Eagle Hill), Chelsea, Everett, Medford, Somerville, Arlington, and Cambridge

Figures 6-16 and 6-17 illustrate the annual hours of dwell and persistence by runway end for 2004 through 2009. In 2009, the major contributor to dwell and persistence was in the main north-south flow with arrivals to Runways 4L and 4R and 33L and departures from Runways 22l and 22R. In 2009, there was a decrease in both the dwell and persistence for arrivals to Runways 22L, 22R, 15R, and 27 and departures from Runways 4L, 4R, 9, and 33L.

11 *Logan Airside Improvements Planning Project Final EIS*, Section 4.2.3 PRAS Monitoring and Reporting June 2002.

Figure 6-16 Comparison of Annual Hours of Dwell Exceedance by Runway End for 2004 to 2009

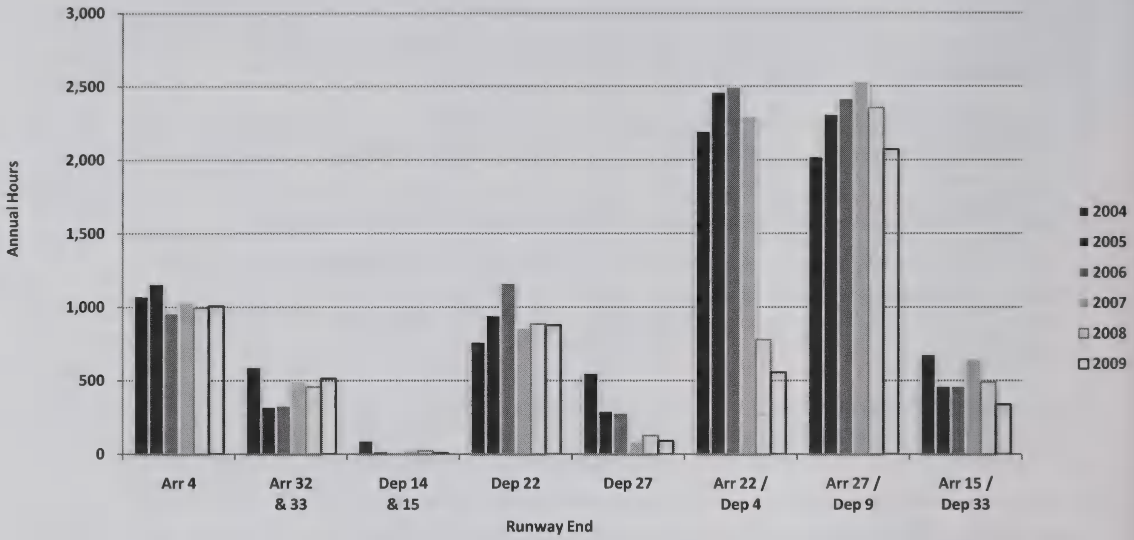
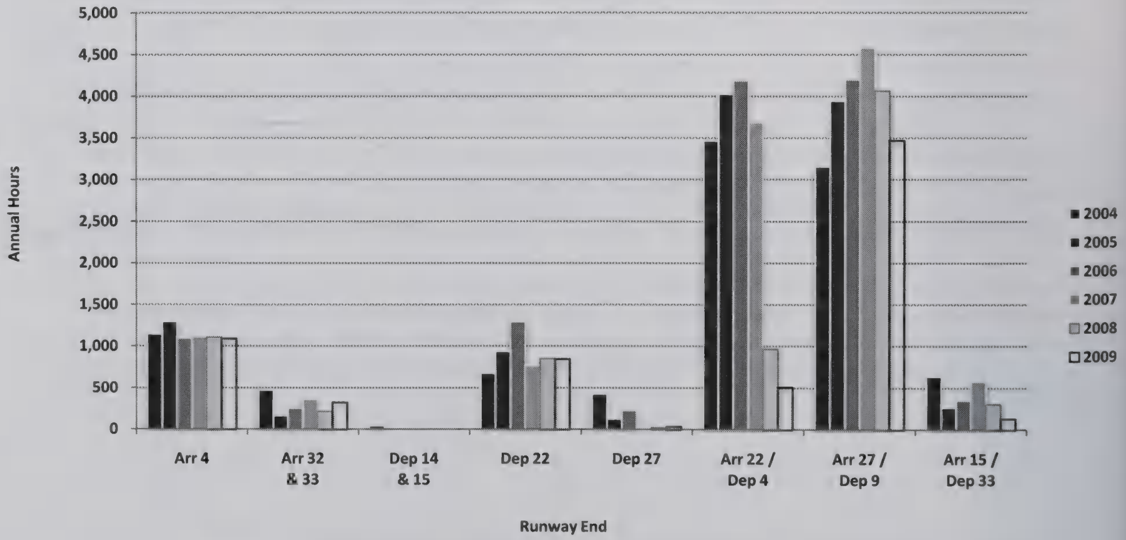


Figure 6-17 Comparison of Annual Hours of Persistence Exceedance by Runway End for 2004 to 2009



Time Above

The third supplemental noise metric reported in this *2009 EDR* is the amount of time that aircraft noise is higher than each of three predefined threshold sound levels. The measure is referred to generally as time above (TA), and the threshold sound levels used in the analysis are 65, 75, and 85 dBA (A-weighted decibels). Like DNL values, these times are computed using the FAA-approved INM as modified for Logan Airport. The calculations are made at each of Massport's permanent noise monitoring locations and are based on an average 24-hour day during the year as well as for the average 9-hour nighttime period from 10:00 PM to 7:00 AM. The threshold sound levels of 65, 75, and 85 dBA reflect different degrees of speech interference depending on factors such as whether people are outdoors, indoors with their windows open, or indoors with windows closed.
Table 6-13 presents a summary of the calculated TA values for 2009.

The TA results at many of the sites correspond to the change in the contour levels. At Site 4, which is affected by Runway 9 departures, and Runway 27 arrivals (utilization for arrivals and departures decreased in 2009), the TA65 level decreased from 103.0 minutes in 2008 to 92.9 minutes in 2009, TA75 decreased from 44.7 to 39.7 minutes, and TA85 increased from 8.3 to 10.1 minutes.

Site 12, which is affected by Runways 22R and 15R departures, experienced a decrease in the TA65 and TA75 levels. The TA65 decreased from 178.5 minutes in 2008 to 154.6 minutes in 2009 and the TA75 decreased from 40.8 minutes in 2008 to 33.5 minutes in 2009. These changes match the measured decrease from 64.2 dB to 61.1 dB.

At Site 16 (Revere – Bradstreet and Sales), the TA65 increased from 36.8 in 2008 to 38.0 minutes in 2009, which matches the measured increase from 67.9 dB DNL in 2008 to 68.2 dB DNL in 2009.

Table 6-13 Time Above dBA Thresholds for Average Day, 2009[1]									
			Minutes above Threshold in a 24-Hour Period			Minutes above Threshold During Nighttime			
Location	Site	Distance from Logan Airport (miles)	85dBA	75dBA	65dBA	85dBA	75dBA	65dBA	Modeled Day-Night Sound Levels[2]
Winthrop – Bayview and Grandview	4	1.6	10.1	39.7	92.9	0.9	3.4	8.2	72.7
Winthrop – Harborview and Faun Bar	5	1.9	0.5	10.4	69.7	0.0	1.0	6.3	63.6
Winthrop – Somerset near Johnson	6	0.8	0.0	3.8	80.5	0.0	0.4	10.7	61.1
Winthrop – Loring Road near Court	7	1.0	2.7	27.9	138.9	0.2	3.3	17.9	67.7
Winthrop – Morton and Amelia	8	1.6	0.1	3.8	53.4	0.0	0.5	7.7	61.2
East Boston – Bayswater near Annavoy	9	1.3	2.4	23.1	71.1	0.5	3.7	11.1	70.0
East Boston – Bayswater near Shawsheen	10	1.3	0.2	6.2	39.4	0.0	0.6	6.6	61.6
East Boston – Selma and Orient	11	1.8	0.0	1.2	20.9	0.0	0.1	2.6	56.5
East Boston Yacht Club	12	1.2	0.9	33.5	154.6	0.1	4.7	19.8	66.8
East Boston High School	13	1.9	0.4	5.2	26.8	0.1	0.7	3.4	61.7
East Boston – Jeffries Point Yacht Club	14	1.2	0.0	0.5	8.9	0.0	0.0	0.9	55.3
East Boston – Piers Park	30	1.5	0.0	0.3	4.2	0.0	0.0	0.4	52.8
Chelsea – Admiral's Hill	15	2.8	0.2	3.8	23.7	0.0	0.5	3.0	60.2
Revere – Bradstreet and Sales	16	2.4	2.0	14.0	38.0	0.5	2.7	6.9	67.9
Revere – Carey Circle	17	5.3	0.0	2.0	23.3	0.0	0.3	4.5	58.7
Nahant – U.S.C.G. Recreational Facility	18	5.9	0.0	0.0	1.0	0.0	0.0	0.1	45.6
Everett – Tremont near Prescott	21	4.5	0.0	0.4	8.4	0.0	0.1	1.1	53.3
Medford – Magoun near Thatcher	22	6.0	0.0	0.2	4.8	0.0	0.0	0.6	50.9
Swampscott – Smith Lane	19	8.7	0.0	0.0	2.0	0.0	0.0	0.2	46.5
Lynn - Pond and Towns Court	20	8.4	0.0	0.0	2.8	0.0	0.0	0.8	50.5
South End – Andrews Street	1	3.7	0.0	0.4	4.5	0.0	0.1	0.9	52.1
South Boston – B and Bolton	2	2.9	0.0	0.9	8.7	0.0	0.2	1.5	55.8
South Boston – Day Blvd. near Farragut	3	2.5	0.1	4.3	40.1	0.0	0.2	4.0	60.1
Roxbury – Boston Latin Academy	27	5.3	0.0	0.2	3.9	0.0	0.0	0.7	50.7
Jamaica Plain - Southbourne Road	28	7.7	0.0	0.0	1.3	0.0	0.0	0.2	46.9
Mattapan – Lewenburg School	29	7.3	0.0	0.0	0.7	0.0	0.0	0.1	45.6
Dorchester – Myrtlebank near Hilltop	23	6.3	0.0	0.0	7.8	0.0	0.0	1.0	53.3
Milton – Cunningham Park near Fullers	24	8.1	0.0	0.0	6.2	0.0	0.0	0.9	52.5
Quincy – Squaw Rock Park	25	4.2	0.0	0.0	0.7	0.0	0.0	0.0	46.4
Hull – Hull High School near Channel Street	26	6.0	0.0	0.2	8.9	0.0	0.0	2.4	55.2

Notes: Distance from Logan Airport calculated from the Airport Reference Point.
1 INMv7.0b for all of 2009 (12 months) with adjusted database. (Database modifications as described in the *Logan Airport 1994/1995 GEIR)*.
2 Modeled using RealContours™ and RealProfiles™ using INM v7.0b.

Noise Abatement

As noise levels at Logan Airport have decreased in recent years, Massport's emphasis on noise abatement has focused on the benefits of better analysis tools and improved modeling techniques for the purpose of identifying remaining causes of noise problems. In 2004, Logan Airport experienced an increase in annual operations for the first time since the drop-off that occurred following September 11, 2001. This increase peaked in 2005 and has dropped since then due to the downturn in the economy; however Massport's noise abatement program still plays a critical role in helping to limit and monitor noise impacts.

In 2008, the installation of a new noise operations monitoring system was completed and after successful testing, the system was operationally accepted by Massport in 2009. Unlike the previous system, the new system is incorporated directly into Massport's computer network. Other significant benefits of the new system include vastly improved analysis and mapping capabilities, use of multilateration radar (a separate and unique source of operational data), and direct correlation of noise events with radar flight paths and complaints (a feature that the prior system did not have). This latter capability is expected to further improve the ability of the system to differentiate between aircraft and community noise sources.

The new noise and operations monitoring system obtains better quality flight tracking data (multilateration radar data) than available with the current radar. In 2004, Massport evaluated radar data provided both by the FAA Standard Terminal Automation Replacement System (STARS) and by PASSUR Aerospace passive radar system and found the PASSUR data to be more consistent with its requirements at the time. The STARS data is FAA's radar data as used by the ATC tower and the PASSUR data is an enhanced version of the STARS data available to airports. The PASSUR data was used in the former monitoring system and has been used for modeling since the *2004 ESPR*. For the *2009 EDR*, Massport used the new multilateration radar data for these reports. All measured data and complaint information in this report were generated through the new NOMS system.

Other continuing elements of Massport's noise mitigation program include:

- Flight tracks designed to optimize over-water operations (especially during nighttime hours).
- One of the most extensive residential and school sound insulation programs in the nation. To date, Massport has installed sound insulation in 5,256 residences, including 11,136 dwelling units, and 36 schools in East Boston, Roxbury, Dorchester, Winthrop, Revere, Chelsea, and South Boston.
- To initiate the process with each new grant, Massport's Residential Sound Insulation Program (RSIP) representative mails applications to a set of eligible homeowners and often follows up with phone calls to encourage participation. Historically, the percentage of eligible homeowners who respond and whose dwellings are ultimately treated varies significantly by community from a high of nearly 90 percent in Revere to a low of about 50 percent in South Boston. Eighty to 85 percent of homeowners in East Boston and Winthrop typically participate. Approximately 8 percent of applicants also choose the Room-of-Preference option that allows the owner to identify a room (usually a bedroom or living room) for extra acoustical treatment.
- Figure 6-18 presents the 65 dB DNL contours for 2008 and 2009 and to provide context, the graphic also captures the 65 dB DNL Logan Airside Improvements Planning Project EIS Mitigation Contour. The mitigation contour is adjusted to reflect land use patterns and is the basis for Massport's sound insulation program currently underway.

- Continued support of a website that features an internet flight tracking system known as Airport Monitor (www.massport.com/environment). The site provides the general public with the opportunity to track individual flights to and from Logan Airport; it also provides substantive information on Massport's sound insulation program, the Airport's noise monitoring system, various abatement measures, and other information of interest to the public.
- On-line logging of noise complaints.
- Summary reports of operations by airline, runway, aircraft type, and other parameters that help the Noise Office track potential changes in the noise environment. Tables 6-14 and 6-15 provide examples of these reports.

Commercial air carrier and cargo operators are deploying the newest engine technology at Logan Airport. Table 6-14 summarizes each airline operator and the percentage of its fleet that were originally manufactured as Stage 3 or Stage 4 aircraft. In 2009, the majority of the commercial air carrier and cargo operations are in aircraft which were originally manufactured as Stage 3 with a small percentage originally manufactured as Stage 4. Only five airlines of the 46 airlines listed were using aircraft originally manufactured as Stage 2 but have been recertificated to comply with Stage 3 requirements. Of the major cargo operators, UPS remained at 100 percent, FedEx increased its share from 79 to 83 percent, and DHL improved to almost 95 percent as it has been phasing out its fleet of older Boeing 727 aircraft. Most of the charter operators remained similar to 2008 or increased their percentage of originally manufactured Stage 3 or Stage 4 aircraft operations. Only one major U.S. Airline, Northwest Airlines, had a fleet which is not composed of 100 percent originally manufactured Stage 3 or Stage 4 aircraft operating at Logan Airport. Northwest Airlines is in the process of phasing out its fleet of DC-9 aircraft as it integrates with Delta Air Lines, but its originally manufactured Stage 3 or Stage 4 operations level still fell from 90 percent in 2008 to 79 percent in 2009. Only Capitol Cargo International had a fleet operating below 50 percent of originally manufactured Stage 3 or Stage 4 aircraft operations in 2009 but with few operations in 2009 (165 operations).

Source: HMMH, Inc. 2010, Massport NOMS/ERA Multi-Lat, MassGIS, and EEA.

2009 DNL Contour (INM 7.0b)
2008 DNL Contour (INM 7.0b)
Airside Sound Insulation Mitigation Contour

Comparison of the 65 dB DNL Contour for 2008 and 2009 Operations and 65 dB DNL Logan Airside Improvements Planning Project EIS Mitigation Contour

Figure 6-18

Table 6-14 Percentage of Airline Operations in Original Stage 3 or 4 Aircraft During 2009

Airlines with more than 100 flights	Number of Flights 2009	Percentage of Original Stage 3 and 4 Operations[1]						100% Stage 3 or 4[2]
		2004	2005	2006	2007	2008	2009	
JetBlue Airways	40,438	100%	100%	100%	100%	100%	100%	✓
US Airways	37,992	100%	100%	100%	100%	100%	100%	✓
American Airlines	25,933	100%	100%	100%	100%	100%	100%	✓
Delta Air Lines	25,129	100%	97%	98%	100%	100%	100%	✓
American Eagle Airlines	21,448	100%	100%	100%	100%	100%	100%	✓
United Air Lines	17,532	100%	100%	100%	100%	100%	100%	✓
Delta Connection/Comair	17,441	100%	100%	100%	100%	100%	100%	✓
AirTran Airways	13,665	100%	100%	100%	100%	100%	100%	✓
Continental	10,479	100%	100%	100%	100%	100%	100%	✓
Northwest Airlines	8,899	87%	87%	94%	96%	90%	79%	
AWAC - US Air Express	7,590	NA	NA	NA	NA	NA	100%	✓
Air Canada Jazz	5,064	100%	100%	100%	100%	100%	100%	✓
US Airways Express/Republic	4,897	100%	100%	100%	100%	100%	100%	✓
Chautauqua	4,156	100%	100%	100%	100%	100%	100%	✓
Virgin America	3,371	NA	NA	NA	NA	NA	100%	✓
Federal Express	3,107	70%	72%	70%	71%	79%	83%	
Air Canada	3,017	100%	100%	100%	100%	100%	100%	✓
Southwest Airlines	2,602	NA	NA	NA	NA	NA	100%	✓
Shuttle America Corp	2,585	NA	0%	0%	100%[5]	100%	100%	✓
Compass Airlines	2,384	NA	NA	NA	NA	100%	100%	✓
Pinnacle Airlines	2,341	NA	NA	100%	100%	100%	100%	✓
British Airways	2,128	100%	100%	100%	100%	100%	100%	✓
Spirit Airlines	1,942	NA	NA	NA	NA	100%	100%	✓
Alaska Airlines	1,818	100%	100%	100%	100%	100%	100%	✓
Lufthansa	1,724	100%	100%	100%	100%	100%	100%	✓
Midwest Express	1,649	99%	100%	100%	100%	100%	100%	✓
United Parcel Service	1,358	94%	94%	98%	100%	100%	100%	✓
Continental Express/Expressjet	1,344	NA	NA	NA	NA	100%	100%	✓
Aer Lingus	1,275	100%	100%	100%	100%	100%	100%	✓
Air France	916	100%	100%	100%	100%	100%	100%	✓
Mesa Airlines	797	NA	0%	100%	100%	100%	100%	✓
Icelandair	781	100%	100%	100%	100%	100%	100%	✓
Virgin Atlantic	739	100%	100%	100%	100%	100%	100%	✓
Swiss Air	668	100%	100%	100%	100%	100%	100%	✓
Alitalia	644	100%	100%	100%	100%	100%	100%	✓
Iberia Air Lines Of Spain	503	NA	NA	100%	100%	100%	100%	✓
SATA International Airlines	374	100%	100%	100%	100%	100%	100%	✓
Airborne Express	275	NA	NA	NA	NA	100%	100%	✓
DHL Airways	273	0%	20%	1%[4]	1%	88%	95%	
ATI	268	NA	NA	NA	NA	NA	99%	

Table 6-14 Percentage of Airline Operations in Original Stage 3 or 4 Aircraft During 2009 (Continued)

Airlines with more than 100 flights	Number of Flights	Percentage of Original Stage 3 and 4 Operations[1]						100% Stage 3 or 4[2]
	2009	2004	2005	2006	2007	2008	2009	
Sun Country Airlines	256	NA	NA	NA	NA	NA	100%	✓
TACV-Cabo Verde	211	NA	NA	NA	NA	NA	100%	✓
Miami Air	198	78%	98%	91%	100%	100%	100%	✓
US Airways, Inc.	195	NA	NA	NA	NA	NA	100%	✓
Bombardier Business Jet Solutions	188	NA	NA	NA	NA	NA	100%	✓
Capital Cargo International	165[3]	0%	0%	0%	7%	0%	0%	
Delta Connection/Atlantic SE	164	100%	100%	1	100%	100%	100%	✓

Source: Massport.
Notes: NA Airline had no operations at Logan Airport.
1 Operations for some carriers differ with those in *Chapter 2, Activity Levels* and *Chapter 7, Air Quality/Emissions Reduction* because the table only includes jet aircraft, not turboprops, and it includes scheduled and unscheduled air carriers.
2 Original Stage 3 or 4 means originally manufactured as a certificated Stage 3 or 4 aircraft under FAR Part 36.
3 No aircraft used at the Airport were original Stage 3 or 4 aircraft.
4 In 2006, DHL Airways took over Airborne which had no original Stage 3 or 4 aircraft.
5 In 2008, Shuttle America Corp. began operating for Delta Connection.

Noise Complaint Line

In 2009, Massport received a total of 5,869 noise complaints from 51 communities, an increase of 28.1 percent from 2008, when the Noise Abatement Office received 4,580 complaints. Table 6-15 is a summary of noise complaints from the Massport Noise Abatement Office. *Appendix H, Noise Abatement* has a full listing of the complaints by community. Six communities had more than 100 complaints from an individual caller which partially attributes for the increase. Other increases may be due to increased overflights compared to 2008. Among communities with more than 100 annual complaints, the greatest increases were in East Boston (up from 575 in 2008 to 1,657 in 2009), Medford (up from 150 to 504), Nahant (up from 100 to 400), Chelsea (up from 414 to 570), Marshfield (up from 141 to 228), and Winthrop (up from 430 to 513). These increases are not unexpected given the increased use of Runway 33L for departures during 2008 and 2009 compared to 2007, as well as the increased use of Runway 9 for departures in 2009 compared to 2008. Three communities with more than 100 annual complaints experienced a decrease in noise complaints for 2009: Cambridge (down from 674 in 2008 to 471 in 2009), Somerville (down from 430 to 325), and Weymouth (down from 222 to 184).

Table 6-15 Noise Complaint Line Summary

Town	2008 Calls	2008 Callers	2009 Calls	2009 Callers	Change (2008 to 2009)	Town	2008 Calls	2008 Callers	2009 Calls	2009 Callers	Change (2008 to 2009)
Chelsea	414	43	570	32	156	Cambridge	674	41	471	29	(203)
East Boston	575	71	1,657	55	1,082	Hull	65	22	23	10	(42)
Marshfield	141	11	228	6	87	Lexington	127	1	0	0	(127)
Medford	150	29	504	67	354	Somerville	430	114	325	87	(105)
Nahant	100	37	400	111	300	Weymouth	222	2	184	4	(38)
Winthrop	430	150	513	170	83	Woburn	288	3	3	3	(285)

Source: Massport

Massport's noise abatement goals are achieved through implementation of multiple elements. Table 6-16 lists these goals and the associated plan elements, and reports on progress toward achieving these goals.

Boston Logan Airport Noise Study

The FAA's Record of Decision (ROD) approving construction of the new unidirectional Runway 14-32 requires that the FAA, Massport, and the Community Advisory Committee (CAC) jointly undertake a study to determine whether changes to existing noise abatement flight track corridors might further reduce noise impacts. In addition, the Massachusetts Environmental Policy Act (MEPA) Certificate for the *Boston-Logan Airside Improvements Planning EIR* directed Massport to work with the FAA and local communities on a review of the Logan Airport PRAS.

The BLANS noise study is being conducted in multiple phases. Phase 1 of the Study was initiated in the winter of 2004 and was completed in fall of 2007. During Phase 1, 53 airspace and operational alternatives to reduce noise related to Logan Airport overflights were identified and screened for safety, operational, and noise benefits. Of the 53 alternatives, 13 measures were identified as potentially implementable in the near term. The first phase of this was completed in 2007 and a National Environmental Policy Act (NEPA) Categorical Exclusion was issued by FAA in October 2007 for several flight path changes mostly along the northeast and southeast shores from the Airport.

The conventional and radar vectored[12] changes which could be implemented without airspace changes were implemented in February of 2008. Area Navigation (RNAV) and other changes began taking place in 2009 when FAA has completed design of these procedures. RNAV procedures were published on October 22, 2009 and are scheduled to begin implementation in 2010.

Phase 2 which is on-going is considering the following:

- Some carry-over measures from Phase 1 that could not be implemented early;
- Ground noise abatement measures that were not part of the Phase 1 scope of work;

12 Radar vector is the heading issued to aircraft to provide guidance by radar.

- Additional noise abatement measures identified by the CAC that meet their noise abatement goals and objectives; and
- A review of the existing Preferential Runway Advisory System (PRAS) and whether it should proceed in its current state or be reevaluated.

At the conclusion of Phase 2, the CAC will recommend to Massport and FAA a series of measures for implementation. These measures will be the subject of an environmental review to be prepared in Phase 3 that will document the potential environmental impact of the proposed measures. If CAC and Massport decide to assess the PRAS program, that effort would be under Phase 3.[13]

Phase 2, currently underway, includes a more detailed analysis of alternatives (plus other alternatives that may be proposed by the FAA, the community, and other interested parties) as well as an assessment of alternatives requiring additional environmental review including ground noise. Phase 3 will begin reevaluating Logan Airport's PRAS, although at this time PRAS is expected to be reevaluated after potential additional measures from Phase 2 are in place. Phase 2 is known as the BLANS and began in spring of 2009 and is on-going. Additional information is available from the project's website (www.Bostonoverflight.com).

13 Information gathered from www.bostonoverflight.com, May 2010.

Table 6-16 Noise Abatement Management Plan

Noise Abatement Goal	Plan Elements	2009 Progress Report
Limit total aircraft noise	Limit on Cumulative Noise Index (CNI)	The CNI value for 2009 was 152.3 EPNdB, well below the cap of 156.6 EPNdB.
	Stage 3 percentage Requirement in Noise Rules	In 2009, Stage 3 operations represented 100 percent of Logan Airport's total commercial jet traffic. The few Stage 2 operations that occurred during the year were all older small corporate jets flown by Charters and because these aircraft were less than 75,000 pounds gross takeoff weight, they were in full compliance with FAR Part 91, but still prohibited from operating at Logan Airport during the hours of 11:00 PM to 7:00 AM.
Mitigate noise impacts	Residential Sound Insulation Program	287 dwelling units were sound insulated in 2009, bringing the total of treated dwelling units to 11,136 since the start of the program in 1986. See *Appendix H, Noise Abatement* for additional details.
	School Sound Insulation Program	36 eligible schools have been sound insulated since this program began.
	Noise Abatement Arrival and Departure Procedures	Flight track monitoring and data analysis were used to check adherence to noise abatement flight procedures. See *Appendix H, Noise Abatement* for copies of the 2009 Monitoring Report.
	Preferential Runway Advisory System (PRAS) Runway End Use Goals	The PRAS computer system was last used early in 2004 but disabled when the TRACON switched to the STARS radar and moved to Merrimack, NH. Massport has upgraded the system to handle the new STARS data and it was installed during 2009 but it is still not operational. FAA and Massport are reviewing the results of the new software and will make further modifications if necessary.
	Runway Restrictions	Noise-based use restrictions 24 hours per day on departures from Runway 4L and arrivals on Runway 22R were continued.
	Reduced-Engine Taxiing	Use of reduced-engine taxiing is encouraged when appropriate and safe.
Improve Noise Monitoring System	Replace Existing Noise Monitors, Install Multilateration Antennas for Flight Track Monitoring, and Install New Robust Software	Massport wrote a specification for a state-of-the-art system and contracted with Era Corporation to install the system in 2005 and work began in 2006. New noise monitors will provide 1/3 octave band data at all sites to aide with aircraft identification. Noise events, flight events, and complaints will all be linked. Multilateration will provide improved radar coverage near the ground to help in identification of aircraft and runway assignment. The system was operationally accepted in 2009 and will be fully accepted when the contractor completes corrections of any issues.
Minimize nighttime noise	Nighttime Stage 2 Aircraft Prohibition	Prohibition on Stage 2 aircraft operations at Logan Airport between 11:00 PM and 7:00 AM was continued.
	Nighttime Runway Restrictions	Prohibitions on use of Runway 4L for departures and Runway 22R for arrivals between 11:00 PM and 6:00 AM were continued.
	Maximization of Late-Night Over-Water Operation	Efforts to maximize late-night over-water operations were continued. Use of Runway 15R for departures and Runway 33L for arrivals continued.
	Nighttime Engine Run-up and APU Restrictions	Restriction on nighttime engine run-ups and use of auxiliary power units (APUs) was continued.
Address/respond to noise issues and complaints	Noise Complaint Line	Massport continued operation of Noise Complaint Line, (617) 561-3333. In 2009, Massport's Noise Abatement Office responded to 5,869 calls from callers living in 51 communities. The Noise Abatement Office issued the 2009 Noise Report (provided in *Appendix H, Noise Abatement)*.
	Special Studies	Massport continued to provide technical assistance and analysis using noise monitoring system to support FAA and others in monitoring jet departure tracks from Runway 27.
		The Boston Logan Airport Noise Study (BLANS) will determine whether changes to existing flight track corridors might reduce noise impacts. Phase 1 is complete and Phase 2 is underway.

7

Air Quality/ Emissions Reduction

Introduction

This chapter describes the air quality conditions at Logan Airport in 2009 and compares them to air quality conditions in 2008. This information is based on an up-to-date emissions inventory of Airport-related volatile organic compounds (VOCs), oxides of nitrogen (NO_x), carbon monoxide (CO), and particulate matter (PM).[1] An inventory of greenhouse gases (GHGs) is also included. This chapter also presents an update of air quality monitoring data for nitrogen dioxide (NO_2) collected by the Massachusetts Port Authority (Massport) in the vicinity of the Airport. Status reports are provided on Massport's Air Quality Initiative (AQI) (a 15-year voluntary program with the goal of maintaining NO_x emissions at, or below, 1999 levels); the Massport Air Monitoring Study (a program that is gathering air quality data in the communities around Logan Airport before and after the centerfield taxiway is operational); and other Massport air quality and emissions reduction initiatives.

Key Findings

In 2009, the modeled emissions inventory results were driven principally by the lower number of aircraft operations at the Airport compared to 2008 and continual refinements to the Federal Aviation Administration (FAA) Emissions and Dispersion Modeling System (EDMS), v5.1.2.

Air quality conditions in 2009 are described below:

- Total emissions of VOC were 980 kilograms per day (kg/day), or 19 percent lower than 2008 levels.
- Total emissions of NO_x were 3,979 kg/day, or 5 percent lower than 2008 levels. In 2009, total NO_x emissions at Logan Airport (net total with reductions) were approximately 746 tons per year (tpy) lower than the 1999 AQI benchmark. This represents a 32 percent decrease in NO_x emissions since 1999.
- Total emissions of CO were 7,925 kg/day, or 5 percent lower than 2008 levels.

1 PM less than or equal to 10 microns (PM_{10}) and PM less than or equal to 2.5 microns ($PM_{2.5}$) are subsets of PM.

- Because of the refinements to the EDMS model and decreased air traffic, total emissions of $PM_{10}/PM_{2.5}$ associated with operations at Logan Airport have decreased by approximately 12 percent to 71 kilograms per day (kg/day) compared to 2008 levels. By comparison, using the earlier EDMS v5.1 total emissions of $PM_{10}/PM_{2.5}$ would have decreased by approximately 2 percent to 79 kg/day. This variation is attributed to differences in the EDMS versions.
- Other contributing factors to the results of the emissions inventory include the change in stationary source fuel usage and the change in vehicle miles traveled (VMT). Air quality initiatives in place at the Airport and other ongoing efforts by Massport to minimize emissions also played a role.
- Since 1999 there has been a continuing trend of decreasing NO_2 concentrations at both the Massport and Massachusetts Department of Environmental Protection (MassDEP) monitoring sites located in the general vicinity of Logan Airport. In addition, the annual NO_2 concentrations at all monitoring locations in 2009 were well within the National Ambient Air Quality Standards (NAAQS) for NO_2.
- The first phase of a two-phase Massport Air Quality Monitoring Study commenced in September 2007, and was completed September 2008, and a final report will be issued summarizing the findings. The study is collecting ambient data on a variety of air pollutants over a two year period and assessing air quality changes attributable to the operation of the new centerfield taxiway. The second phase of the study will begin in September 2010 now that the centerfield taxiway is completed and fully operational.
- The year 2009 marks the third consecutive year in which Massport has voluntarily prepared a GHG emissions inventory for the Environmental Data Report (EDR). The 2009 GHG emission inventory has been updated incorporating guidance developed by the Transportation Research Board's (TRB) Airport Cooperative Research Program (ACRP). The ACRP guidance was published in April 2009 for airport operators developing an airport-specific GHG emissions inventory.[2] While not including emissions from the cruise phase of flight above 3,000 feet, in a change from previous EDRs, the 2009 inventory assigns emissions based on ownership and control boundaries (i.e., emissions and sources associated with Massport, airport tenants and the general public). The vast majority of the emission sources at Logan Airport are owned or controlled by the airlines, other airport tenants, and passenger vehicles. Massport operations contribute only 11 percent of the total GHG emissions for the Airport. Total Logan Airport GHG emissions in 2009 were 14 percent lower than 2008 levels.

2 Transportation Research Board, Airport Cooperative Research Program, ACRP Report 11, Project 02-06, *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories* (in production). See http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf for the full report.

Regulatory Framework

The federal Clean Air Act (CAA), the NAAQS, and similar state laws govern air quality issues in Massachusetts. The NAAQS and the Massachusetts State Implementation Plan (SIP), promulgated to demonstrate compliance with the CAA (and its 1990 amendments), regulate air quality issues in this area, and are discussed in the next section.

National Ambient Air Quality Standards

The United States (U.S.) Environmental Protection Agency (EPA) established NAAQS for a group of criteria air pollutants to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. These NAAQS are set for the following six pollutants: CO, lead (Pb), NO_2, ozone (O_3), PM_{10}, $PM_{2.5}$, and sulfur dioxide (SO_2). The NAAQS primary standards (designed to protect human health) and secondary standards (designed to protect human welfare) including the 2010 changes are summarized on Table 7-1.

Table 7-1 National Ambient Air Quality Standards

Pollutant	Averaging Time	Standard ppm	Standard µg/m³	Notes:
Carbon Monoxide (CO)	1 hour	35	40,000	Not to be exceeded more than once a year.
	8 hour	9	10,000	Not to be exceeded more than once a year.
Lead (Pb)	Rolling 3-Month Avg	—	0.15	Not to exceed this level. Effective January 12, 2009.
	Quarterly	—	1.5	Not to exceed this level.
Nitrogen Dioxide (NO_2)	1 hour	0.100	188	The three-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm. Effective January 22, 2010.
	Annual	0.053	100	Not to exceed this level.
Ozone (O_3)	8 hour[1]	0.08	157	The average of the annual 4th highest daily 8-hour maximum over a three-year period is not to exceed this level.
	8 hour[2]	0.075	147	The average of the annual 4th highest daily 8-hour maximum over a three-year period is not to exceed this level. Effective May 27, 2008.
Particulate Matter with a diameter $\leq$ 10 µm (PM_{10})	24 hour	—	150	Not to be exceeded more than once a year on average over three years.
	Annual	—	—	Standard was revoked by EPA in 2006.
Particulate Matter with a diameter $\leq$ 2.5 µm ($PM_{2.5}$)	24 hour	—	35	The three-year average of the 98th percentile for each population-oriented monitor within an area is not to exceed this level.
	Annual	—	15	The three-year average of the weighted annual mean from single or multiple monitors within an area is not to exceed this level.
Sulfur Dioxide (SO_2)	1 hour	0.075	197	Final rule signed June 2, 2010. The three-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed this level.
	3 hour	0.5	1,300	Not to be exceeded more than once a year.
	24 hour	0.14	365	Not to be exceeded more than once a year. (Revoked as of June 2, 2010.)
	Annual	0.03	80	Not to exceed this level. (Revoked as of June 2, 2010.)

Source: EPA, 2010 (www.epa.gov/air/criteria.html).
1 The 1997 NAAQS for ozone.
2 The 2008 NAAQS for ozone.
ppm Parts per million
µg/m³ Micrograms per cubic meter

Based on air monitoring data and in accordance with the CAA, all areas within Massachusetts are designated with respect to the NAAQS as *attainment*, *nonattainment*, *maintenance*, or *unclassifiable*.[3] An area with air quality better than the NAAQS is designated as attainment; an area with air quality worse than the NAAQS is designated as nonattainment; and an area that is in transition from nonattainment to attainment is designated as attainment/maintenance. An area may also be designated as unclassifiable when there is a temporary lack of data to form a basis for determining attainment status. Nonattainment areas can be further classified as extreme, severe, serious, moderate, and marginal by the degree of non-compliance with the NAAQS. The current attainment/nonattainment designations for the Boston metropolitan area are summarized in Table 7-2.

The entire Boston metropolitan area is presently designated as attainment for all the criteria pollutants except O_3, for which it is designated as "moderate" nonattainment for the 1997 eight-hour ozone standard (Table 7-2). The O_3 nonattainment area consists of ten counties in Massachusetts (Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester). Logan Airport is located in Suffolk County. The Boston area is also presently designated as attainment/maintenance for CO, indicating that it is in transition back to attainment for this pollutant.

Table 7-2 Attainment/Nonattainment Designations for the Boston Metropolitan Area

Pollutant	Designation
Carbon monoxide (CO)	Attainment/Maintenance[1]
Nitrogen Dioxides (NO_2)	Attainment
Ozone (8-hr)	Nonattainment (Moderate)
Particulate matter (PM_{10})	Attainment
Particulate matter ($PM_{2.5}$)	Attainment
Sulfur Dioxide (SO_2)	Attainment
Lead (Pb)	Attainment

Source: EPA, 2010 (www.epa.gov/air/oaqps/greenbk/).
1 The Boston area was previously designated nonattainment for this pollutant but has since attained compliance with the NAAQS.

State Implementation Plan (SIP)

A SIP is a state's regulatory plan for bringing nonattainment areas within that state into compliance with the NAAQS. As indicated above, the entire Boston area is presently designated as "moderate" nonattainment for the 1997 eight-hour O_3 standard. By 2010, MassDEP was required to submit an updated SIP to the EPA for the newer 2008 eight-hour O_3 standard. However, a further expected tightening of the NAAQS for O_3 is now proposed by the EPA and these SIPs are due in 2013. The current and future SIPs for the Boston area are summarized in Table 7-3.

3 Environmental Protection Agency, *The Green Book Nonattainment Areas for Criteria Pollutants* (www.epa.gov/air/oaqps/greenbk/).

Table 7-3 State Implementation Plan for Ozone

Standard	Title	Status	Comments
One-Hour	One-hour Ozone Attainment Demonstration for the Massachusetts Portion of the Boston-Lawrence-Worcester, Massachusetts-New Hampshire Ozone Nonattainment Area.	Published December 6, 2002, as final rule.	EPA approved this SIP revision and established an attainment date of November 15, 2007, for the entire multi-state nonattainment area. Focuses on the control of NO_x and VOCs as precursors to ozone. This is the "currently approved" SIP for the Boston area.
Eight-Hour	Final Massachusetts State Implementation Plan To Demonstrate Attainment of the National Ambient Air Quality Standard for Ozone	Submitted to EPA, January 31, 2008, for approval.	This standard calls for the attainment of the 1997 eight-hour NAAQS for ozone by 2010 and focuses on the control of NO_x and VOCs as precursors to ozone. (The EPA call for states to submit SIPs for the new 2008 eight-hour NAAQS for ozone is scheduled for 2013).[1,2]

Source: MassDEP (www.mass.gov/dep/air/priorities/sip.htm).

1 In 2007, the EPA promulgated a new eight-hour NAAQS for ozone. Informally called the "2008 standard" to differentiate it from the former "1997 standard", this new standard is more strict (i.e., lower) than the former standard. Designations of attainment/nonattainment for the 2008 standard will be made by the EPA in 2010. Presently, it is not known which designation will be given to the Boston area but it is very likely to be designated as a "nonattainment" area for the new "2008 standard" for ozone.

2 The SIP established the Logan Airport Parking Freeze and the limit of 17,319 commercial/3,373 employee spaces at the Airport in 2007, this remains the same in 2009.

Logan Airport Air Quality Permits for Stationary Sources of Emissions

Massport was granted a Title V Air Quality Operating Permit for Logan Airport in September 2004. This permit covers all of the Massport-operated stationary sources including the Central Heating and Cooling Plant, snow melters, fuel dispensers, boilers, emergency electrical generators, and fuel storage tanks.

Methodology

The analysis of air emissions associated with Logan Airport operations includes the following source categories; each of which has its own assessment methodology, database, and assumptions as described below.

- **Aircraft Emissions** – The FAA EDMS is the EPA-preferred and the FAA-required program for calculating aircraft emissions. Because the FAA continually improves the performance, precision and adaptability of the EDMS, the program is subject to regular updates and revisions. For this analysis, the most recent version, EDMS v5.1.2, was used to compute the 2009 Logan Airport emissions inventory. Compared to the previous version (EDMS v5.1) used in the *2008 Environmental Data Report (2008 EDR)*, the two most notable changes include the upgrade from Base of Aircraft Data (BADA) v3.5 to v3.7, which contains updated aircraft performance coefficients used to calculate thrust, fuel flow, cruise speed, etc.; and the cap on emissions at the 20 kilometer (km) horizontal threshold for aircraft that do not reach the mixing height within this range.

  As with recent Environmental Status and Planning Reports (ESPRs) and EDRs, the actual aircraft fleet mix at Logan Airport was used to analyze 2009 conditions. In a few instances where the aircraft/engine type or combinations operating at Logan Airport were not available in the EDMS database, consistent with FAA guidance, substitutions were made based on the closest match of aircraft type and engine performance characteristic. Table I-1 in *Appendix I, Air Quality/Emissions Reduction* contains the data that were used, including aircraft type, engine, landing and takeoff operations (LTOs), and aircraft taxi/delay

times. For the analysis, the aircraft are grouped into four categories: commercial air carriers, commuter aircraft, general aviation (GA), and cargo aircraft.

Each landing and takeoff cycle (LTO) consists of taxiing, queuing, takeoff, climb out, approach, and landing operations. The comparison of LTO emissions may not be relevant to any assessment of any specific airline's overall environmental performance. From 2008 to 2009, total LTOs decreased by approximately 7 percent overall with air carrier LTOs decreasing by approximately 4 percent, air cargo LTOs decreasing by about 24 percent, and GA decreasing by approximately 49 percent.

Aircraft taxi/delay times are based on data obtained from the FAA Aviation System Performance Metrics (ASPM) database for 2009.[4] According to this database, the average aircraft taxi/delay times at Logan Airport decreased from 26.1 minutes to 25.3 minutes from 2008 to 2009, or about 3 percent.

- **Ground Service Equipment/Auxiliary Power Units** — Estimates of ground service equipment (GSE) emissions for 2009 were based on EDMS emission factors and continue to reflect emission reductions attributable to Massport's Alternative Fuel Vehicle (AFV) Program, and the conversion of Massport and/or tenant GSE and fleet vehicles to compressed natural gas (CNG) or electricity. Model input data are based on an on-site GSE time-in-mode survey completed in 2004 and information regarding GSE fuel use (e.g., gasoline, diesel, CNG, etc.) from the Logan Airport Vehicle Aerodrome Permit Application process.[5]
- **Motor Vehicles** — Motor vehicle emission factors were obtained from the most recent version of EPA's MOBILE model (MOBILE6.2.03) combined with MassDEP recommended motor vehicle fleet mix data, operating conditions, and other Massachusetts-specific input parameters. MOBILE is preferred by MassDEP and used to develop motor vehicle emissions budgets for the SIP. The MOBILE input/output files are included in *Appendix I, Air Quality/Emissions Reduction*. In addition, *Chapter 5, Ground Transportation*, of this *2009 EDR* provides a discussion of the vehicle miles traveled (VMT) data used for this air quality analysis.
- **Other Sources** — Emissions associated with the fuel storage and handling, the Central Heating and Cooling Plant, and other stationary sources at Logan Airport were based on annual fuel throughput records for 2009, combined with EPA emission factors (Compilation of Air Pollution Emission Factors [AP-42]) or emission factors obtained from NO_x Reasonably Available Control Technology (RACT) compliance testing. When compared to 2008, No. 2 fuel oil and No. 6 fuel oil usage increased approximately 35 percent and 2,150 percent, respectively, while natural gas, deicing activities, and snow melter usage decreased by approximately 6 percent, 62 percent, and 1 percent, respectively. The increase in No. 6 fuel oil in 2009 is a change from the usage in 2008. In 2008, due to the rising cost of fuel oil, the usage of natural gas was favored over No. 6 fuel oil. Despite the increase in No. 6 fuel oil usage in 2009, the throughput volume is the second lowest since 1999 (the lowest occurred in 2008).
- **Particulate Matter** — Estimates of PM emissions associated with Logan Airport were first reported in the *2005 EDR* in response to the then recent availability of an FAA-updated method (e.g., first order approximation) for computing aircraft $PM_{10}/PM_{2.5}$ emission factors. $PM_{10}/PM_{2.5}$ emissions are now routinely reported in the EDRs/ESPRs including this *2009 EDR*.
- **Greenhouse Gases** — GHG emissions were calculated in much the same way criteria pollutants were calculated - through the use of input data such as activity levels or material throughput rates (i.e., fuel usage, VMT, electrical consumption) that are applied to appropriate emission factors (i.e., in units of GHG

4 FAA Aviation System Performance Metrics (ASPM) database for 2009 (aspm.faa.gov/).
5 All vehicles and equipment (including GSE) that operate on the airfield must obtain a *Logan Airport Vehicle Aerodrome Permit*. The application form for this permit was modified in 2007 to request the fuel-type information (e.g., gasoline, diesel, etc.).

emissions per gallon of fuel). Input data were either based on Massport records, or data and information derived from the EDMS v5.1.2. Emission factors were obtained from the U.S. Energy Information Administration (EIA), the International Panel on Climate Change (IPCC), and the EPA. The year 2009 GHG emissions inventory includes aircraft operations within the ground-based taxi-idle/delay mode and up to the top of the 3,000-foot LTO cycle.[6] In this *2009 EDR*, GHG emissions associated with GSE/APU, motor vehicles, a variety of stationary sources, and electricity usage were also included. Of note, Massport has direct ownership or control over a very small percentage of these GHG emissions and their sources (i.e., limited to Massport fleet vehicles, stationary sources, and electrical consumption within Massport buildings). The vast majority of the emission sources at Logan Airport are owned or controlled by the airlines, other airport tenants, and the general public (motor vehicles).

Emissions Inventory for 2009

This section provides a summary of the 2009 Logan Airport emissions inventory for the pollutants VOC, CO, NO_x, and $PM_{10}/PM_{2.5}$. Emissions of O_3 are not directly computed as it is a secondary pollutant formed by emissions of NO_x and VOCs. Emissions of SO_2 and Pb are also not computed, as airport emission sources are very small generators of these two compounds. The aircraft emissions inventory was computed based on the actual number of aircraft operations (i.e., LTOs), fleet mix, and operational times-in-mode (TIM) at the Airport in 2009. Correspondingly, emissions associated with GSE, motor vehicles, fuel storage and transfer facilities, and a variety of stationary sources (i.e., steam boilers, snow melters, live-fire training, back-up generators, etc.) associated with Logan Airport were also computed based on actual conditions.

As in preceding EDRs, the results of the 2009 emissions inventory are compared with the results for 2008 and other previous years extending back to 1990. For ease of comparison in this EDR, the summary figures now contain the previous results in five-year intervals for 1990, 1995, and 2000 and then annually for 2004 to 2009.[7] However, to show the most recent data and to be consistent with other sections of the EDR, the summary tables only contain the results for 2004 through 2009. In this way, the changes in Logan Airport air quality conditions can be evaluated in both the short- and long-term time frame and on a common basis. For the AQI, estimates of 2015 NO_x emissions are also provided as a way of monitoring the progress of this voluntary emission management program. The results for the intervening years (i.e., 1995, 1996, 1997, etc.) are shown in previous EDRs and contained in *Appendix I, Air Quality/Emissions Reduction.*

Volatile Organic Compounds

In 2009, total VOC emissions at Logan Airport were 394 tpy (980 kg/day); an estimated decrease of approximately 19 percent from 2008 levels. This calculated decrease is largely due to the reduction in VOC emissions from aircraft engines. Figure 7-1 depicts a long-term downward trend in VOC emissions at Logan Airport and Figure 7-2 shows the 2009 percent breakdown of these emissions by source category. Similarly, Table 7-4 shows the computed VOC emissions in kg/day for each emission source from 2004 to 2009. Other key findings include the following:

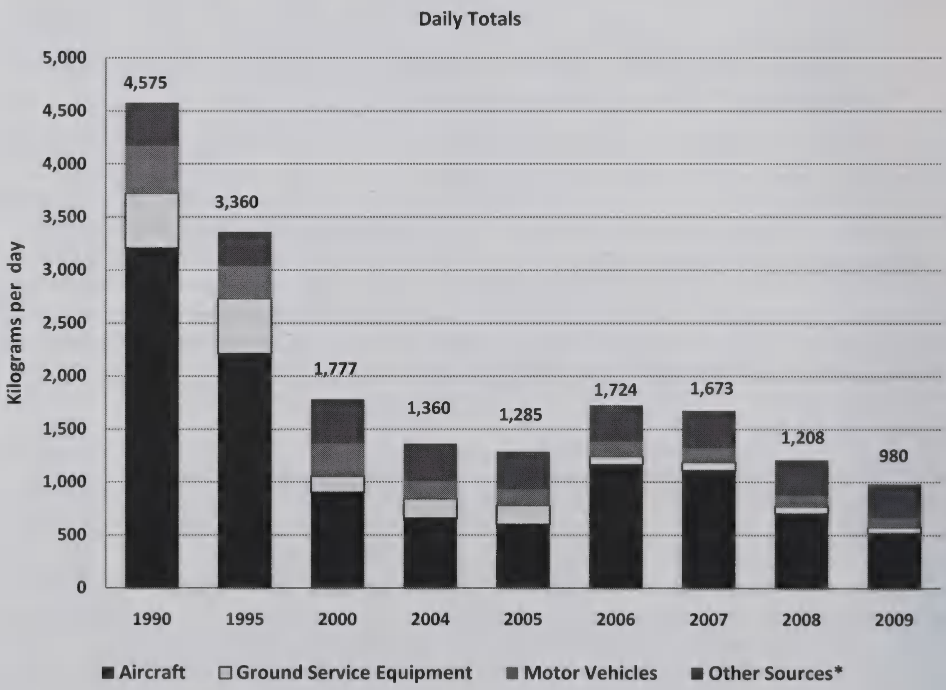
6 Following the guidance issued by the Airport Cooperative Research Program, ACRP Report 11, *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories* (in production).

7 The results for the intervening years (i.e., 1995, 1996, 1997, etc.) are shown in previous EDRs and contained in *Appendix I, Air Quality/Emissions Reduction.*

- Total aircraft-related VOC emissions were approximately 26 percent lower in 2009, when compared to 2008. This decrease was largely due to the decrease in aircraft LTOs.
- GSE-related VOC emissions were approximately 15 percent lower in 2009 than in 2008. This decrease also was largely due to the decrease in aircraft LTOs.
- Total VOC emissions from motor vehicles in 2009 declined by approximately 13 percent from 2008 levels. The reduction in motor vehicle emissions is attributable mostly to lower VMT, which are associated with the reduced number of passengers, as well as the lower emission factors of the 2009 motor vehicle fleet.
- VOC emissions from stationary and other sources (e.g., fuel storage/handling, Central Heating and Cooling Plant, snow melter usage and firefighter training) decreased by approximately 5 percent from 2008 to 2009; mostly due to the lower demand for jet fuel.

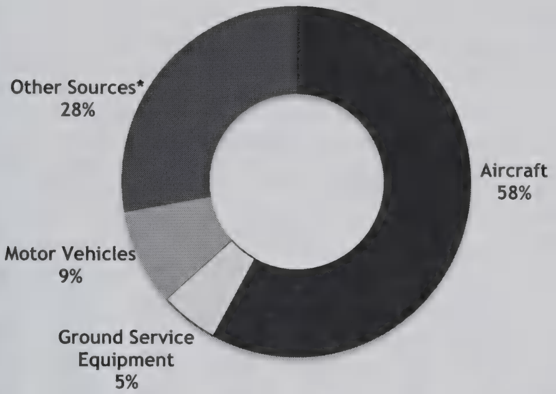
As Figure 7-2 shows, aircraft continue to represent the largest source (53 percent) of VOC emissions associated with Logan Airport, followed by stationary sources (32 percent), motor vehicles (9 percent), and GSE (6 percent). In summary, the 2009 results contained in Table 7-4 show a 19 percent decrease of total emissions of VOCs when compared to 2008. This decrease is consistent with long-term trends at Logan Airport.

Figure 7-1 Emissions of VOC at Logan Airport



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.) and fueling sources.

Figure 7-2 Sources of VOC Emissions in 2009



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.) and fueling sources.

Table 7-4 Estimated VOC Emissions (in kg/day) at Logan Airport[1]

Year	2004	2005	2006		2007		2008		2009	
Aircraft/GSE Model	EDMS v4.21	EDMS v4.5		EDMS v5.0.1		EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model	MOBILE6.2.03									
Aircraft Sources										
Air carriers	292	271	227	511	435	381	324	286	237	**235**
Commuter aircraft	127	140	125	371	479	409	253	176	131	**133**
Cargo aircraft	110	41	19	46	129	112	107	70	71	**71**
General aviation	127	147	147	236	226	206	201	171	78	**78**
Total aircraft sources	656	599	518	1,164[2]	1,269	1,108	885	703	517	**517**
Ground Service Equipment[3]	187	178	167	77	78	78	66	66	56	**56**
Motor Vehicles										
Parking/curbside[4]	38	37	33	33	31	31	25	25	22	**22**
On-airport vehicles	129	118	106	106	104	104	82	82	71	**71**
Total motor vehicle sources	167	155	139	139	135	135	107	107	93	**93**
Other Sources										
Fuel storage/handling	341	340	336	336	338	338	320	320	307	**307**
Miscellaneous sources[5]	9	13	8	8	14	14	13	12	7	**7**
Total other sources	350	353	344	344	352	352	333	332	314	**314**
Total Airport Sources	1,360	1,285	1,168	1,724	1,834	1,673	1,391	1,208	980	**980**

Notes: Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
kg/day - kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).

1 See *Appendix I, Air Quality/Emissions Reduction* for 1993 to 2003 emission inventory results.
2 The 2006 increase in aircraft VOC emissions is largely attributable to the addition of aircraft main engine startup emissions.
3 GSE emissions include APUs as well as vehicles and equipment converted to alternative fuels.
4 Parking/curbside is based on VMT analysis.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Oxides of Nitrogen

In 2009, total NO_x emissions from all Airport-related sources were estimated to be 1,601 tpy (3,979 kg/day), which is a modeled decrease of approximately 5 percent from 2008 levels. This also represents an overall decrease of 35 percent from 1999 levels, the benchmark of the AQI which is discussed later in this chapter. Figure 7-3 depicts these short- and long-term trends in NO_x emissions and Table 7-5 shows the allotment for each emission source in 2004 through 2009.

Table 7-5 Estimated NO_X Emissions (in kg/day) at Logan Airport[1]

Year	2004	2005	2006		2007		2008		2009	
Aircraft/GSE Model	EDMS v4.21	EDMS v4.5		EDMS v5.0.1		EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model	MOBILE6.2.03									
Aircraft Sources										
Air carriers	2,949	2,880	2,849	3,044	3,120	3,121	3,031	3,031	2,944	**2,952**
Commuter aircraft	245	225	195	256	353	354	319	319	309	**234**
Cargo aircraft	215	211	192	125	248	248	233	233	215	**204**
General aviation	49	50	49	60	56	56	43	43	27	**23**
Total aircraft sources	3,458	3,366	3,285	3,485	3,777	3,779	3,626	3,626	3,495	**3,413**
Ground Service Equipment[2]	333	312	280	300	299	299	257	257	219	**219**
Motor Vehicles										
Parking/curbside[3]	21	22	19	19	18	18	15	15	13	**13**
On-airport vehicles	267	269	238	238	233	233	182	182	153	**153**
Total motor vehicle sources	288	291	257	257	251	251	197	197	166	**166**
Other Sources										
Fuel storage/handling[4]	0	0	0	0	0	0	0	0	0	**0**
Miscellaneous sources[5]	211	218	109	109	128	128	124	124	181	**181**
Total other sources	211	218	109	109	128	128	124	124	181	**181**
Total Airport Sources	4,290	4,187	3,931	4,151	4,455	4,457	4,204	4,204	4,061	**3,979**

Notes: Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
kg/day - kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).

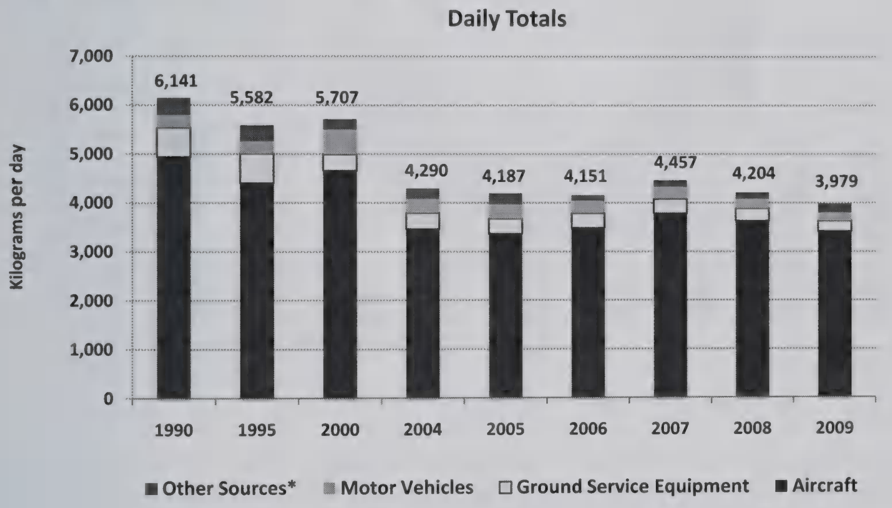
1 See *Appendix I, Air Quality/Emissions Reduction* for 1993 to 2003 emission inventory results.
2 GSE emissions include APUs as well as vehicles and equipment converted to alternative fuels.
3 Parking/curbside data is based on VMT analysis.
4 Fuel storage/handling facilities are not a source of NO_x emissions.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Other findings related to NO_x emissions include the following:

- When compared to 2008 levels, total aircraft-related NO_X emissions were 6 percent lower in 2009. This decrease is largely due to the lower number of aircraft operations at Logan Airport over this two year time frame.
- GSE emissions of NO_x decreased by 15 percent in 2009 compared to 2008, again, due mostly to the lower number of aircraft operations at Logan Airport.
- NO_x emissions from motor vehicles decreased by approximately 16 percent from 2008 levels. This reduction is attributable mostly to lower VMT and the lower emission factors of the 2009 motor vehicle fleet.

- Stationary sources show an increase of approximately 46 percent in NO_x emissions in 2009 compared to 2008, largely due to the higher NO_x emission factors for boilers used in the *2009 EDR*.[8] Despite the increase in NO_x emission factors, the boilers remain in compliance with their permitted allowances and represent only 5 percent of the overall total of NO_x emissions at the Airport. Fifty-eight percent of the increase is the result of higher boiler emission factors. Approximately 30 percent of the increase is explained by an increase in No. 6 fuel oil usage. The remaining increase represents other stationary sources.

Figure 7-3 Emissions of NO_x at Logan Airport



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, firefighter training, etc.).

As shown in Figure 7-4, in 2009, aircraft continued to represent the largest source (86 percent) of NO_x at Logan Airport, followed by GSE (6 percent), motor vehicles (4 percent), and stationary sources (5 percent).

8 If the same emission factors (RACT EF) were used for Central Heating and Cooling Plant's boilers in 2008, the increase in NO_x emissions from stationary sources would be 13 percent from 2008 to 2009.

Figure 7-4 Sources of NO_X Emissions in 2009

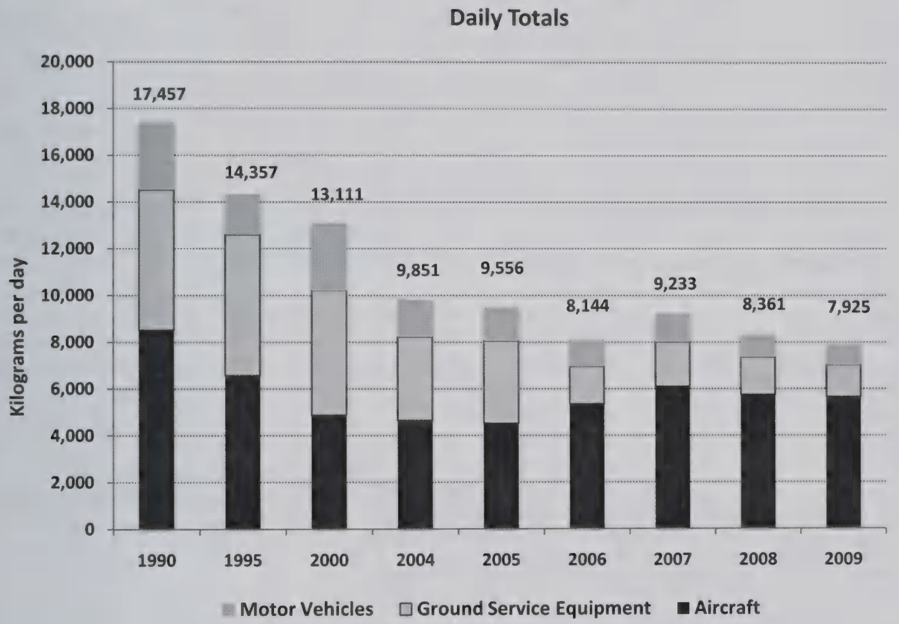
* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.). Values may not add to 100 percent due to rounding.

Carbon Monoxide

Total CO emissions at Logan Airport in 2009 were 3,189 tpy (7,925 kg/day), or approximately 5 percent lower than 2008 levels. Figure 7-5 depicts this long-term downward trend (55 percent an overall reduction from 1990 to 2009) in CO emissions associated with airport activities. Table 7-6 shows the breakdown of these emissions, by source category, for the years 2004 to 2009. The findings of the analysis show the following:

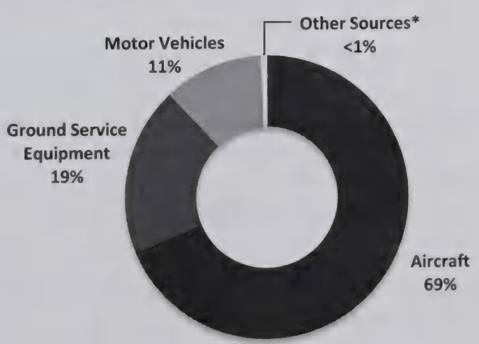
- Modeled aircraft-related CO emissions decreased in 2009 by approximately 2 percent compared to 2008 levels due to shorter FAA-reported taxi/delay times and lower number of aircraft operations for Logan Airport.
- Modeled GSE CO emissions also decreased by approximately 15 percent in 2009 compared to 2008. Again, this is mostly due to the lower number of aircraft operations at Logan Airport.
- CO emissions from motor vehicles declined in 2009 by approximately 11 percent from 2008 levels. This reduction is attributable mostly to lower VMT and the lower emission factors of the motor vehicle fleet over this time period.
- Stationary source emissions of CO remained unchanged in 2009 compared to 2008. Overall, stationary sources represent less than 1 percent of the overall total of CO emissions at the Airport.

Figure 7-5 Emissions of CO at Logan Airport



As shown in Figure 7-6, aircraft emissions continued to represent the largest source (71 percent) of CO at Logan Airport in 2009, followed by GSE (17 percent), motor vehicles (11 percent), and stationary sources (less than 1 percent).

Figure 7-6 Sources of CO Emissions in 2009



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.).

Table 7-6 Estimated CO Emissions (in kg/day) at Logan Airport[1]

Year	2004	2005	2006		2007		2008		2009	
Aircraft/GSE Model	EDMS v4.21	EDMS v4.5		EDMS v5.0.1		EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model	MOBILE6.2.03									
Aircraft Sources										
Air carriers	2,985	2,895	2,828	3,167	2,973	2,973	2,710	2,710	2,460	**2,448**
Commuter aircraft	1,010	1,010	950	1,587	2,484	2,484	2,436	2,436	2,364	**2,795**
Cargo aircraft	229	174	138	158	241	241	255	255	256	**266**
General aviation	416	437	398	442	401	403	345	345	145	**150**
Total aircraft sources	4,640	4,516	4,314	5,354	6,099	6,101	5,746	5,746	5,225	**5,659**
Ground Service Equipment[2]	3,586	3,531	3,409	1,586	1,904	1,904	1,609	1,609	1,364	**1,364**
Motor Vehicles										
Parking/curbside[3]	180	179	144	144	139	139	117	117	107	**107**
On-airport vehicles	1,412	1,290	1,036	1,036	1,038	1,038	834	834	740	**740**
Total motor vehicle sources	1,592	1,469	1,180	1,180	1,177	1,177	951	951	847	**847**
Other Sources										
Fuel storage/handling[4]	0	0	0	0	0	0	0	0	0	**0**
Miscellaneous sources[5]	33	40	24	24	51	51	55	55	55	**55**
Total other sources	33	40	24	24	51	51	55	55	55	**55**
Total Airport Sources	9,851	9,556	8,927	8,144	9,231	9,233	8,361	8,361	7,491	**7,925**

Notes: Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
kg/day - kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).
1 See *Appendix I, Air Quality/Emissions Reduction* for 1993 to 2003 emission inventory results.
2 GSE emissions include APUs as well as vehicles and equipment converted to alternative fuels.
3 Parking/curbside information is based on VMT analysis.
4 Fuel storage/handling facilities are not a source of CO emissions.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Particulate Matter

Table 7-7 shows that total estimated $PM_{10}/PM_{2.5}$ emissions at Logan Airport in 2009 were 29 tpy (71 kg/day). This represents an approximate 12 percent decrease from the 2008 modeled levels and is mostly attributable to changes in the EDMS model. When using the prior version of EDMS (v5.1), total Airport-related emissions of $PM_{10}/PM_{2.5}$ are shown to decrease by only 2 percent in 2009 compared to 2008. Other findings of the analysis include the following:

- Modeled aircraft-related $PM_{10}/PM_{2.5}$ emissions decreased approximately 18 percent in 2009 compared to 2008 levels. Part of this decrease is due to changes in the EDMS model. Refinements and changes occur regularly as new aircraft engine emissions data are collected and incorporated into EDMS by the FAA. The slightly shorter aircraft taxi-in/delay TIM and fewer aircraft operations for Logan Airport in 2009 compared to 2008 also played a role in this outcome.
- GSE/APU $PM_{10}/PM_{2.5}$ emissions decreased 7 percent in 2009 mostly due to the lower number of aircraft operations at Logan Airport.
- $PM_{10}/PM_{2.5}$ emissions from motor vehicles declined in 2009 by approximately 14 percent from 2008 levels. This reduction is attributable mostly to lower VMT and the lower emission factors of the motor vehicle fleet over this time period.

- Stationary source emissions of $PM_{10}/PM_{2.5}$ increased by approximately 67 percent in 2009 compared with 2008, which is attributable to the higher No. 6 fuel oil usage. However, the stationary source emissions of $PM_{10}/PM_{2.5}$ in both 2008 and 2009 represent the lowest emissions since 2005. Stationary sources represent only 7 percent of the overall total of $PM_{10}/PM_{2.5}$ emissions at the Airport.

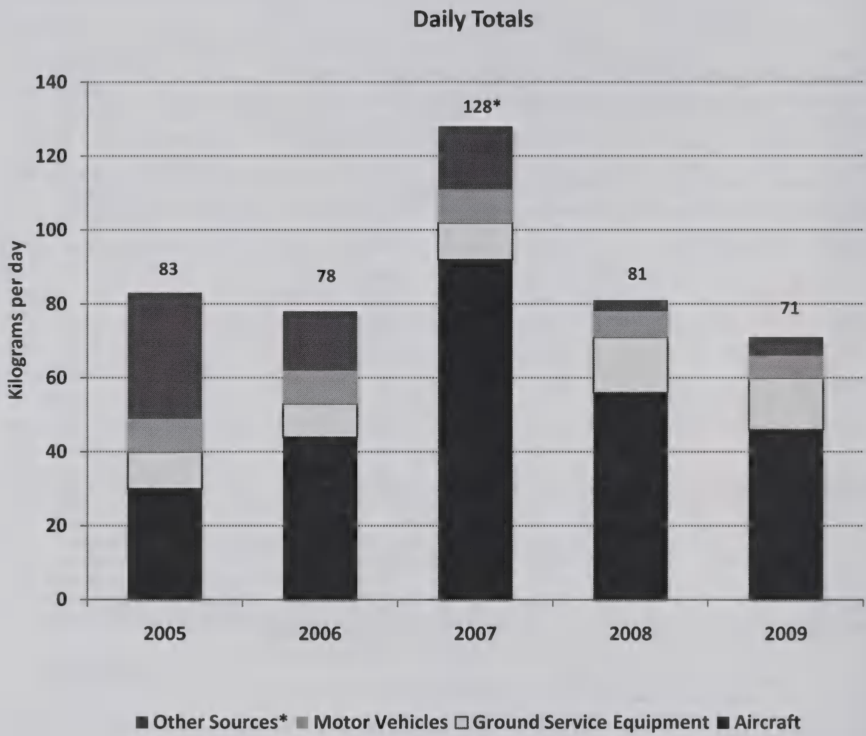
Table 7-7 Estimated $PM_{10}/PM_{2.5}$ Emissions (in kg/day) at Logan Airport[1]

Year	2005[2]	2006[3]		2007[4]		2008[5]		2009[6]	
Aircraft/GSE Model	EDMS v4.5		EDMS v5.0.1		EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model	MOBILE6.2.03								
Aircraft Sources									
Air carriers	25	25	38	35	67	63	42	43	**36**
Commuter aircraft	1	1	2	6	14	11	6	5	**5**
Cargo aircraft	2	3	2	3	6	5	4	4	**3**
General aviation	2	2	2	2	5	5	4	2	**2**
Total aircraft sources	30	31	44	46	92	84	56	54	**46**
Ground Service Equipment[3]	11	9	9	10	10	8	15	14	**14**
Motor Vehicles									
Parking/curbside[4]	1	1	1	<1	<1	<1	<1	<1	**<1**
On-airport vehicles	8	8	8	9	9	7	7	6	**6**
Total motor vehicle sources	9	9	9	9	9	7	7	6	**6**
Other Sources									
Fuel storage/handling[5]	0	0	0	0	0	0	0	0	**0**
Miscellaneous sources[6]	34	16	16	17	17	3	3	5	**5**
Total other sources	34	16	16	17	17	3	3	5	**5**
Total Airport Sources	84	65	78	82	128	102	81	79	**71**

Notes: Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
kg/day - kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy); PM - particulate matter
1 It is assumed that all PM are less than 2.5 microns in diameter ($PM_{2.5}$).
2 2005 is the first year that $PM_{10}/PM_{2.5}$ emissions were included in the Logan Airport ESPR/EDR emission inventories.
3 GSE emissions include APUs as well as vehicles and equipment converted to alternative fuels.
4 Parking/curbside is based on VTM analysis.
5 Fuel storage and handling facilities are not sources of PM emissions.
6 Includes the Central Heating and Cooling Plant, emergency electricity generation, fire training, snow melters, and other stationary sources.

As shown in Figures 7-7 and 7-8, aircraft represent the largest (65 percent) source of $PM_{10}/PM_{2.5}$ followed by GSE (20 percent), motor vehicles (8 percent), and stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.) (7 percent).

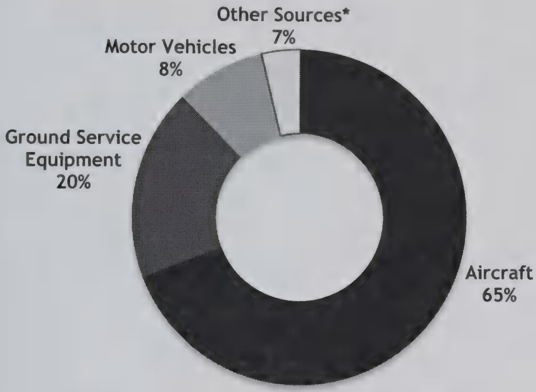
Figure 7-7 Emissions of $PM_{10}/PM_{2.5}$ at Logan Airport



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.).

** In 2007, 46 kg /day of PM emissions were attributable to changes in the EDMS model.

Figure 7-8 Sources of $PM_{10}/PM_{2.5}$ Emissions in 2009



* Other sources include stationary sources (e.g., Central Heating and Cooling Plant, snow melter usage, fire training, etc.).

Measured NO_2 Concentrations

This section presents the results of Massport's ambient (i.e., outdoor) air quality monitoring program for NO_2, a pollutant associated with aircraft activity and other fuel combustion sources. Since 1982, Massport has collected NO_2 concentration data at numerous locations both on the Airport and in neighboring residential communities. The purpose of this monitoring program is to track long-term trends in NO_2 levels and to compare the results to the NAAQS for this pollutant.

The protocol for this monitoring program calls for sample collection using passive diffusion tube technology for a period of one week each month for 12 months of the year at each of the monitoring stations (Figure 7-9). The samples, along with Quality Assurance/Quality Control (QA/QC) samples, are then analyzed in a laboratory for levels of NO_2.

Table 7-8 presents the 2009 NO_2 monitoring data and Figure 7-9 depicts the locations of the 27 sites currently in the Massport NO_2 monitoring network. For comparative purposes, historical data from 1999 to 2008 are also shown in Table 7-8. The table also includes NO_2 data collected separately by MassDEP using continuous monitors at four Boston-area locations (Figure 7-9).

Table 7-8 Massport Annual NO_2 Concentration Monitoring Results ($\mu g/m^3$)

Monitoring Site	Site No.	Year										
		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Massport Monitoring Sites												
Runway 9	1	61.0	58.2	41.6	45.8	33.9	30.1	35.0	31.9	17.3	31.3	32.2
Runway 4R	2	55.6	44.6	41.4	36.9	32.5	30.9	30.7	29.0	17.2	20.2	19.2
Runway 33L	3	47.7	42.6	39.4	33.3	30.8	25.4	24.5	26.3	24.2	21.6	16.9
Runway 27	4	42.9	37.8	35.8	30.3	25.5	24.1	22.7	22.3	16.9	18.3	17.6
Runaway 22L	5	47.5	39.8	38.2	33.8	27.8	23.7	22.1	24.9	17.1	21.3	20.1
Runway 22R	6	60.6	59.2	51.6	45.0	32.3	29.7	32.9	25.1	24.8	29.7	27.8
Runway 15R	7	47.0	43.4	44.3	42.6	40.8	28.7	27.7	28.7	20.5	24.2	23.9
Main Terminal Area	8	70.8	87.0	80.7	69.3	44.3	44.7	46.2	43.5	29.5	41.7	37.7
Webster St., Jeffries Point	11	52.4	45.5	43.4	39.1	32.5	28.3	31.3	31.3	22.7	25.2	23.9
Maverick Square, E. Boston	12	81.2	72.2	68.5	61.3	47.9	46.5	41.4	45.6	36.0	41.3	38.2
Bremen St., E. Boston	13	59.1	52.6	52.0	46.2	39.1	35.7	37.6	37.1	27.8	30.1	28.6
Shore St. E. Boston	14	45.7	38.5	38.8	35.0	27.2	24.0	24.9	22.4	18.1	19.7	18.3
Orient Heights Yacht Club	15	45.1	46.9	47.7	43.1	29.4	25.2	25.5	25.1	19.6	21.1	18.3
Bayswater St. E. Boston	16	45.2	45.5	48.3	41.2	28.4	22.8	30.4	23.1	18.4	20.2	17.8
Annavoy St. E. Boston	17	40.8	39.2	44.4	33.7	24.7	21.4	23.3	21.0	18.2	19.6	17.3
Pleasant St. Winthrop	18	42.0	39.3	37.8	32.3	27.9	22.6	23.4	21.4	17.8	20.2	17.7
Court Road, Winthrop	19	40.0	36.1	33.8	27.4	24.0	19.2	22.3	21.0	16.3	17.1	16.7
Cottage Park Yacht Club	20	37.1	50.9	45.9	36.7	22.5	19.1	27.7	21.4	16.3	18.4	17.8
Winthrop, Point Shirley	21	33.1	37.7	38.6	24.4	22.7	17.4	17.2	20.2	15.7	15.6	14.9
Deer Island	22	36.3	31.9	33.8	33.1	21.3	17.8	16.9	17.8	13.0	17.0	14.7
Runway 4R–9	23	42.2	66.0	42.3	33.4	28.6	24.1	27.1	26.3	19.2	22.4	21.2
Runway 33L–4R	24	44.3	41.7	41.8	33.5	28.1	24.3	22.3	25.7	20.9	25.2	20.0
Runway 22R–33L	25	62.4	50.3	49.4	42.2	33.8	31.7	29.4	34.5	22.9	25.1	25.3
Jeffries Point Park/Marginal St.	26	68.6	49.8	45.0	42.0	35.2	30.5	32.5	31.7	24.4	27.0	25.6
Harborwalk	27	54.3	48.5	47.4	43.5	35.6	35.5	29.3	34.2	24.2	26.1	24.5
Logan Athletic Fields	29	NA	69.1	67.6	54.9	41.9	40.2	37.5	37.0	24.6	28.8	26.8
Brophy Park, Jeffries Point	30	NA	48.0	45.2	41.0	36.5	31.2	32.9	31.3	24.8	26.6	24.6
Average of all Monitoring Sites		**50.5**	**50.5**	**47.5**	**40.0**	**31.7**	**28.0**	**28.7**	**28.7**	**21.0**	**24.3**	**22.5**
MassDEP Monitoring Sites[1]												
Long Island Rd (MassDEP)	A	20.7	24.4	22.6	22.6	16.9	12.6	13.2	13.2	13.2	13.2	11.3
Harrison Ave. (MassDEP)	B	NA	45.1	47.0	45.1	43.2	37.4	35.8	35.8	37.7	37.7	33.9
Kenmore Square (MassDEP)	C	56.4	54.5	56.8	47.0	47.0	51.7	43.3	43.3	39.6	41.5	37.7
East First Street (MassDEP)	D	39.5	37.6	43.2	39.5	39.5	36.8	33.9	39.6	37.7	30.2	28.3

Notes: The NAAQS is 100 $\mu g/m^3$.
The site identification labels in Figure 7-9 are keyed to the site labels in this table.

$\mu g/m^3$ micrograms/cubic meter.

NA Not available.

1 NO_2 monitoring sites operated by the MassDEP.

Figure 7-9 Massport NO_2 Monitoring Sites

As shown on Table 7-8, 2009 NO_2 levels were lower than in 2008 at 25 of the 27 Massport monitoring locations and at all four MassDEP locations. There has been an ongoing trend of decreasing NO_2 concentrations at both the Massport and MassDEP monitoring sites since 1999. Other observations of the 2009 data show that:

- Annual NO_2 concentrations at all Massport and MassDEP monitoring locations were below the annual NO_2 NAAQS of 100 micrograms per cubic meter in 2009.
- The highest NO_2 concentrations in 2009 from the Massport program occurred in areas characterized by high levels of motor vehicle traffic (i.e., Main Terminal Area [Site 8] and Maverick Square [Site 12]).
- The average NO_2 concentration of all monitoring sites in 2009 was the second lowest since 1999 (the lowest average occurred in 2007).

Spatial and temporal changes in measured NO_2 levels from year to year are typical and should not be used to define short-term results. Rather, NO_2 levels are better assessed by looking at the trends over several years.

Air Quality Emissions Reduction

As part of the ongoing Logan Airport Air Quality Management Plan, Massport has established a number of goals and objectives to address air emissions from Airport operations, including the minimization of Airport-related emissions through the AQI and the reduction of GSE and Massport fleet emissions with AFV. This section presents a 2009 update on the AQI and the Alternative Fuel Vehicles (AFV) Program at Logan Airport.

Air Quality Initiative

Massport developed the AQI as a 15-year voluntary program with the overall goal to maintain NO_x emissions associated with Logan Airport at or below 1999 levels. The AQI has four primary commitments, shown below, along with Massport's progress in meeting the AQI commitments.

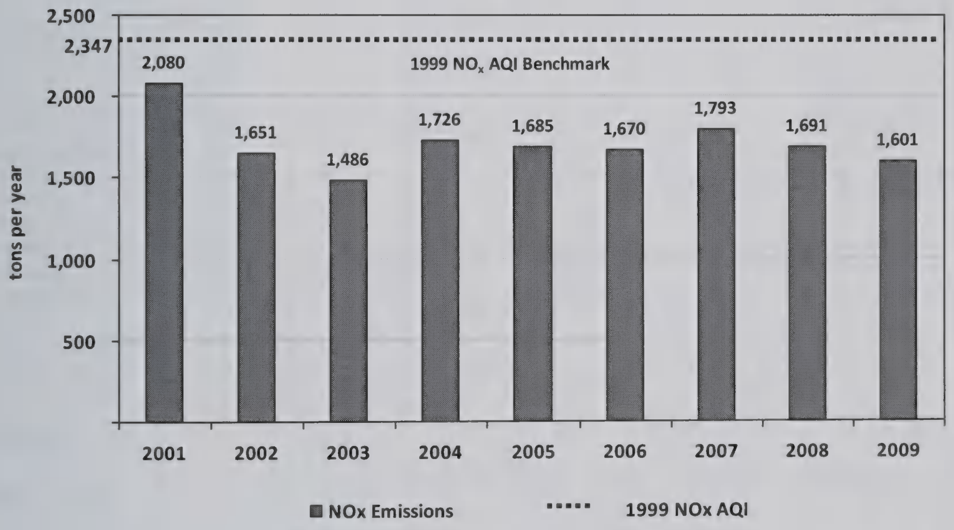
- **Expand on the initiatives already in-place at Logan Airport.** See Table 7-9 for the initiatives in place at the time the AQI was developed.
- **As necessary to maintain NO_x emissions at or below 1999 levels, retire emissions credits, giving priority to mobile sources.** Massport updates the Logan Airport inventory of NO_x emissions annually to reflect new information and changing conditions associated with the Airport's operations. Table 7-9 presents the updated emissions inventory and shows that, in 2009, it was not necessary to purchase and retire mobile source emission credits to maintain NO_x emissions at or below 1999 levels.
- **Report the status and progress of the AQI in the ESPR or EDR.** Massport reports on the status of the AQI in the Logan Airport EDRs and ESPRs and has done so since 2001 (Table 7-9).
- **Continue to work at international and national levels to decrease air emissions from aviation sources.** Massport maintains memberships and active participation in a number of organizations involved in addressing aviation-related environmental issues, including air quality. These include serving on technical review committees for TRB and ACRP, research projects and environmental committees of the American Association of Airport Executives (AAAE), and Airports Council International (ACI).

As shown in Table 7-9, NO_x emissions at Logan Airport in 2009 (net total with reductions) were approximately 746 tpy lower than the 1999 AQI benchmark. This represents a 32 percent decrease since 1999. Between

1999 and 2009, the greatest reductions of NO_x emissions were associated with aircraft, GSE, and on-Airport motor vehicles: 27 percent, 51 percent, and 68 percent reductions, respectively.

Figure 7-10 compares the 1999 threshold level of 2,347 tpy of NO_x emissions to modeled NO_x emissions for 2001 through 2009. Cumulatively, as of December 31, 2009, NO_x emissions at Logan Airport were approximately 5,816 tons below the benchmark set by the AQI. As shown in Table 7-9, based upon current projections, Massport expects that because the emission inventory is projected to be below the 1999 threshold of 2,347 tpy through 2015, no credits will need to be purchased through the AQI period of 2015.

Figure 7-10 NO_x Emissions Compared to AQI[1]



1 Includes emission reductions from the use of alternative fuel vehicles, shuttle buses, and ground service equipment. See Table 7-9.

As part of the reporting process, the AQI calls for an itemization of NO_x emissions generated by activities at Logan Airport according to the individual airline operator. Table 7-10 shows the estimated amounts of NO_x air emissions generated by each airline in units of tpy and tons per LTO.

Table 7-9 AQI Inventory Tracking of NO_X Emissions (in tpy)[1] for Logan Airport

	Actual Conditions[2]											Forecasted Conditions[3]					
	1999[4]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Annual Emissions	2,347[5]	2,315	2,097	1,665	1,499	1,745	1,703	1,688	1,806	1,701	1,609	1,955	1,991	2,026	2,061	2,096	2,131
Above (Below) 1999 Levels Before Reductions	NA	(32)	(250)	(682)	(848)	(602)	(644)	(659)	(541)	(646)	(738)	(392)	(356)	(321)	(286)	(251)	(216)
Potential Reductions/Increases[6]																	
Alternative Fuel Vehicles/Shuttle Bus	(11)	(4)	(4)	(3)	(3)	(10)	(9)	(8)	(7)	(5)	(4)	(4)	(3)	(2)	(1)	0	1
Alternate Fuel Ground Service Equipment[7]	(14)	(14)	(13)	(11)	(10)	(9)	(9)	(10)	(6)	(5)	(4)	(10)	(10)	(10)	(11)	(11)	(11)
Total Potential Reductions	(25)	(19)	(17)	(14)	(13)	(19)	(18)	(18)	(13)	(10)	(8)	(14)	(13)	(13)	(12)	(11)	(10)
Above (Below) 1999 Levels After Reduction	(25)	(51)	(267)	(696)	(861)	(621)	(662)	(677)	(554)	(656)	(746)	(406)	(370)	(334)	(298)	(262)	(226)
Credit Trading[8]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Net Total w/Reductions and Credits	2,322	2,296	2,080	1,651	1,486	1,726	1,685	1,670	1,793	1,691	1,601	1,941	1,977	2,013	2,049	2,085	2,121

Notes: Values in parentheses, such as "(250)" are negative values. Values without parentheses are positive values.

NA Not available.

1 For consistency with the AQI, the NO_x emission values in this table are reported in tpy. The EDR/ESPR Emissions Inventory values are reported in kg/day. A conversion factor of 0.40234 is used to convert kg/day to tpy.

2 1999 and 2004 analysis years were updated in the *2004 ESPR* using EDMS v4.21. The 2000 and 2001 analyses were completed using EDMS v4.03 and MOBILE6. The 2002 to 2003 analyses were completed using EDMS v4.11 and MOBILE6. The 2004 analysis was completed using EDMS v4.21 and MOBILE6.2.01. The 2005 analysis was completed using EDMS v4.5 and MOBILE6.2.03. The 2006 analysis was completed using EDMS v5.0.1 and MOBILE6.2.03. The 2007 analysis was completed using EDMS v5.0.2 and MOBILE6.2.03. The 2008 analysis was completed using EDMS v5.1 and MOBILE6.2.03. The 2009 analysis was completed using EDMS v5.1.2 and MOBILE6.2.03.

3 The years 2010 through 2015 were interpolated using the 2020 analysis provided in Table 7-9 of the *2004 ESPR*. These emission estimates will be updated in the next ESPR based on up-to-date operational forecasts for the Airport. Actuals are expected to be lower and will be reflected in the next ESPR.

4 The year 1999 is the "baseline" year for the AQI. Thus, 2,347 tons/year is considered the AQI threshold for NO_x emissions.

5 The original value of 2,235 tons/year in the AQI was based on the *2001 EDR* results and EDMS v4.03. This value was updated in the *2004 ESPR* using EDMS v4.21.

6 Other initiatives that Massport and Logan Airport tenants may use for possible emission reductions include: Consolidated Car Rental Facility (ConRAC), Central Heating and Cooling Plant boilers, 400-Hz power at gates, and low NO_x fuels in Logan Express buses.

7 Massport's current plan for the conversion of GSE to alternative fuels is being re-evaluated based on the new diesel rule (2007). GSE AFV credits were based on fuel type data obtained from the aerodrome vehicle permit applications in 2007.

8 Since the AQI threshold is not exceeded in 2009, nor are the emissions expected to exceed the threshold in the near future, no credits will need to be purchased in the immediate term.

Table 7-10 Contribution of NO_X Air Emissions by Airline in 2009 (Estimated)

	Total Emissions (tons/year)		Normalized Emissions (tons/LTO)
Air Carrier, by Airline	LTOs	NO_x	NO_x per LTO
Aer Lingus	638	19.54	0.031
Air Canada[1]	5,304	11.17	0.002
Air France	457	21.97	0.048
Air Transport International	135	2.48	0.018
Airborne Express	138	2.84	0.021
Airnet	617	0.01	<0.001
Airtran Airways	6,833	50.67	0.007
Alaska Airlines	909	11.01	0.012
Alitalia	323	8.21	0.025
American Airlines[2]	23,690	196.31	0.008
Astar Air Cargo	140	2.75	0.020
Bombardier Business Jet	251	0.28	0.001
British Airways	1,064	72.82	0.068
Cape Air	18,339	0.24	<0.001
Capital Cargo	83	0.61	0.007
Chautaugua	2,078	5.62	0.003
Continental[3]	5,911	53.16	0.009
Delta Air Lines[4]	23,736	155.84	0.007
FedEx	1,555	58.18	0.037
Finnair	24	0.41	0.017
Frontier	37	0.32	0.009
GA	5,964	9.21	0.002
Iberia	251	8.10	0.032
Icelandair	391	8.13	0.021

	Total Emissions (tons/year)		Normalized Emissions (tons/LTO)
Air Carrier, by Airline	LTOs	NO_x	NO_x per LTO
JetBlue Airways	20,219	166.72	0.008
Lufthansa	861	30.25	0.035
Miami Air	99	1.16	0.012
Midwest Airlines	824	5.53	0.007
Northwest Airlines	4,449	56.06	0.013
Other Air Carrier	32	0.23	0.007
Other International	32	0.63	0.020
Pace	15	0.11	0.007
Porter Airlines	309	0.23	0.001
Republic Airlines	2,448	6.39	0.003
SATA International	187	3.27	0.017
Shuttle America	1,293	4.04	0.003
Southwest Airlines	1,301	12.42	0.010
Spirit	971	8.81	0.009
Sun Country	128	1.21	0.009
Swiss International	334	10.36	0.031
TACV-Cabo Verde	106	1.82	0.017
United Airlines[5]	9,163	122.61	0.013
UPS Airlines	681	15.11	0.022
US Airways[6]	28,277	195.34	0.007
Virgin	370	15.30	0.041
Virgin America	1,686	15.87	0.009
Total	**172,653**	**1,373.33**	**0.008**

Notes: Other International may include: Aeromexico, Emirates Airline, etc.
The "Other" Categories may include airlines with less than 10 operations.
Normalized emissions are based on a Landing and Takeoff Cycle (LTO).
This list combines the major airlines with their commuters (i.e., American Eagle with American Airlines and Continental Airlines with Continental Express, etc.).
Cargo carriers include: Air Transport International; Airborne Express; Airnet; Capital Cargo; Astar Air Cargo; Federal Express; and UPS.
GA – General Aviation

1 Includes Jazz.
2 Includes American Eagle.
3 Includes Continental Express.
4 Includes Delta Connection and Delta Shuttle.
5 Includes United Express.
6 Includes US Airways Express.

Based on Table 7-10, international carriers are the higher NO_x emitters per LTO because their longer stage lengths require aircraft equipped with larger and/or additional engines. Overall, international carriers emit 15 percent of the total aircraft NO_x emissions at Logan Airport. Other results include:

- Carriers with the greatest number of flights tended to generate the highest percentage of total NO_x emissions;
- Combined, the four largest air carriers (by LTO), emitted 52.0 percent of the total aircraft NO_x emissions;
- Commercial airlines (excludes cargo and GA) accounted for 93.3 percent of total aircraft NO_x emissions;
- Cargo aircraft operators accounted for 6.0 percent of total aircraft NO_x emissions; and
- GA aircraft accounted for 0.7 percent of total aircraft NO_x emissions.

Alternative Fuel Vehicles Program

A key component of Massport's Air Quality Management Program is the AFV Program. The AFV Program is designed to replace conventionally-fueled fleet with alternatively fueled or powered vehicles, when feasible, to help reduce emissions associated with Logan Airport operations. For the past 15 years, Massport has provided a privately operated compressed natural gas (CNG) station on site (located on the north side of the Airport near the Economy Parking Lot). This station is the largest CNG station in New England, primarily supports Massport's fleet of 26 shuttle buses and CNG fleet cars, and is open to the public. In 2009, the Logan Airport CNG station dispensed approximately 27,300 gallon-equivalents per month for Massport vehicles. Table 7-11 shows the number of Massport AFVs by vehicle type and the number of vehicles Massport added to and removed from its fleet in 2009.

Table 7-11 Massport's Alternative Fuel Vehicle Fleet Inventory at Logan Airport as of December 31, 2009

Fuel Type	Vehicle	Number
Electric	Pool Vehicle	1
	Cube Van	1
	Segways	2
	Off-road vehicles	24
Compressed Natural Gas (CNG)	Ford Crown Victoria	1
	Van	2
	Pick-Up Truck	6
	Honda Civic	9
	Shuttle Bus	26
Gasoline/Electric Hybrid	Ford Escape	7
Propane	Non-Road Vehicles (Forklifts)	2
E85 Flex Fuel	Crown Victoria	1
	Total	**82**
	Total acquired in 2009	**8**
	Total disposed of in 2009	**0**

Source: Massport.

Six CNG Honda Civics and two electric Segways were acquired in 2009. No AFVs were retired in 2009. Massport now operates 82 vehicles powered by CNG, propane, electricity, E85 flex fuel, or operates hybrids powered by gasoline and alternative power sources. Massport established a vehicle procurement policy in 2006 that requires consideration of AFVs when purchases are made. Beginning in 2013, as part of the Southwest Service Area (SWSA) redevelopment, the existing fleet of diesel rental car shuttles will be replaced by CNG or clean diesel-electric hybrid buses. The *2010 EDR* will provide further details.

Air Quality Management Status

Massport's air quality management program focuses on decreasing emissions, when feasible, from all Airport-related sources, in addition to studying innovative means to achieve emissions reductions. Massport's air quality improvement goals, the measures proposed to accomplish them, and some 2009 milestones are presented in Table 7-12.

Table 7-12 Air Quality Management Plan Status

Air Quality Emissions Reduction Goals	Plan Elements	2009 Status
Reduce emissions from Massport fleet vehicles	Convert Massport fleet vehicles to electricity or CNG by retrofitting or procurement.	Massport continues to procure AFVs/alternative power vehicles (APVs) and substitute them for conventionally fueled vehicles, when feasible. Massport uses the Energy Policy Act (EPAct) of 1992 to expedite Massport's AFV/APV program. Under EPAct, Massport is required to purchase 75 percent of its light-duty vehicles as AFVs. Public safety vehicles are excluded from this requirement. Total accrued banked EPAct credits were 15 in 2009.
Encourage use of alternative fuel and alternative power vehicles by private fleet and airside service vehicle owners	Provide infrastructure to support alternative fuels including CNG and electricity.	Massport continues to operate New England's largest CNG station, which is open to the public. In 2009, the CNG station dispensed approximately 27,300 gallon equivalents per month. Massport plans to support the current and future standard systems for plug-in electric vehicles. For example, the new Consolidated Rental Car Facility (ConRAC) to be constructed in the Southwest Service Area (SWSA) will include the infrastructure necessary to accommodate future plug-in stations for electric vehicles.
	Work with ground access fleet and airside service-vehicle owners to encourage conversion.	Massport encourages conversion to AFVs/APVs by others through such policies as 50 percent discounts in AFV/APV ground access fees to limousines, vans, and buses; limited "front-of-line" taxi pool privileges to hybrid and AFVs/APVs; and preferred parking for hybrid and AFVs/APVs at Logan Airport parking facilities.
	Use of pre-conditioned air (PCA) at new and renovated terminals and terminal gates.	100 percent of the contact gates have PCA and 400-Hz power. This reduces the need for APUs and, consequently, reduces associated emissions.

Table 7-12 Air Quality Management Plan Status (Continued)		
Air Quality Emissions Reduction Goals	**Plan Elements**	**2009 Status**
Minimize emissions from motor vehicles	Implement a program to increase high occupancy vehicle (HOV) ridership by air passengers.	As described in detail in *Chapter 5, Ground Transportation*, there are a number of HOV services serving Logan Airport that are aimed at air passengers, including the MBTA Blue Line and Sliver Line, Logan Express, and water transportation. Massport promotes the use of these services by employees, primarily through the Logan Airport Employee Transportation Management Association (Logan TMA).
	Expand the Logan TMA for Airport employees.	The Logan TMA provides commuting information to all Airport employees. In 2009, there were 2,746 Airport employees participating in the Logan TMA.
Minimize emissions from Construction Equipment	Incorporated Clean Air Construction Initiative (CACI) into major earthwork construction projects.	For all construction projects heavy construction equipment is required to be equipped with diesel particulate filters or diesel oxidation catalysts in accordance with CACI.
Reduce emissions from fuel vapor loss	Provide state-of-the-art fuel storage and distribution equipment.	The Fuel Storage and Distribution System is in operation.
	Implement Tank Management Program.	Refer to *Chapter 8, Water Quality/Environmental Compliance and Management*. Tank management focuses on proper maintenance.
Reduce emissions from stationary sources	Employ Reasonable Available Control Technologies (RACT) for NO_x at Central Heating/Cooling Plant.	RACT policies have been implemented.
	Use alternative fuels in snow melters.	Ultra Low Sulfur Diesel (ULSD) fuel is used in all Massport snow melting equipment.
	Incorporate green building technologies and energy use reduction strategies.	Massport participates in the State Sustainability Program. Terminal A and the Signature Flight Support GA Facility are certified under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™ and Terminal E features green building elements. An overview of sustainability initiatives is presented in *Chapter 1, Introduction/Executive Summary*.
Reduce aircraft emissions	Work with the FAA to study and implement airfield-improvement concepts and operational changes that may have air quality benefits.	Massport promoted such concepts through the *Logan Airside Improvements Planning Project Environmental Impact Statement*, which recommended physical and operational improvements to Logan Airport including construction of the new Runway 14-32 and centerfield taxiway, and other taxiway improvements. Runway 14-32 became operational in November 2006 and the centerfield taxiway was fully opened in summer 2009. In addition, in coordination with Massport, the Massachusetts Institute of Technology (MIT) completed a detailed survey of pilots at Logan Airport to better understand the use of single engine taxiing and issued a paper in March 2010 (*Appendix L*). Massport will communicate with airlines regarding the use of single engine taxiing, when safe to do so, within the Logan Airport operational context.

In addition to measures described in Table 7-12, Massport, through its involvement in the Massachusetts Clean Cities Program, has supported the education of the general public and corporate and public fleet managers with respect to sustainable transportation through its sponsorship and support of the Altwheels Transportation Festival and Altwheels Fleet Day since its inception in 2003.

Greenhouse Gases

There is now widespread consensus that GHGs contribute to climate change (also known as global warming), although there is still some uncertainty regarding the global magnitude of this impact and the associated short- and long-term remedies. In April 2009, the EPA issued a proposed finding that GHGs contribute to air pollution that may endanger public health or welfare. The proposed finding could pave the way for possible regulation of GHG emissions under the CAA, although presently there are no specific U.S. laws or regulations that call for large-scale reductions of GHG. Nonetheless, several climate change bills are currently being proposed in Congress, the focus of which have thus far remained on entities whom emit significant amounts of GHGs and have direct control over these emissions (i.e., power plants, fuel producers, cement manufacturing, etc.).

Current estimates of aviation-related GHG emission contributions to man-made totals range from 2 to 4 percent world-wide and approximately 3 percent nationwide, although there are still no existing or planned federal regulations specifically governing airport-related GHGs in the U.S.[9,10]

In May 2010, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) revised the *Massachusetts Environmental Policy Act (MEPA) Greenhouse Gas Emissions Policy and Protocol*.[11] Under the revised policy, all projects requiring an Environmental Impact Report (EIR) need to comply. These guidelines require certain projects (though not specifically this EDR) undergoing review under MEPA (to:

- Quantify the GHG emissions generated by proposed projects; and
- Identify measures to avoid, minimize, or mitigate such emissions.[12]

Massport has voluntarily set goals and developed plans to reduce and offset GHGs associated with Logan Airport to further minimize the "carbon footprint" of Massport facilities. These initiatives may include (but are not necessarily limited to) the implementation of carbon-based energy saving programs, purchase of renewable energy credits, and other capital investments that will conserve fossil fuel and energy in both the short- and long-term. In conjunction with the Massachusetts Global Warming Solutions Act, Massport is participating in working groups primarily focused on reducing transportation and building energy demand by increasing energy efficiency, providing incentives to increase passengers per vehicle, and expanding upon opportunities for alternative (low-emitting) fuel use within the transportation sector. Planning meetings commenced in early June 2009 and are ongoing. Beginning in October 2009, Massport is part of the Commonwealth's Climate Change Adaptation Advisory Committee. Within this committee, the Key Infrastructure team looked at potential issues at airports related to service disruption, access issues, flooding, and other storm-related impacts. The initial Advisory Committee report is expected in 2010.

9 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, New York City, NY. 2007.

10 U.S. Governmental Accountability Office (GAO), Aviation and the Environment, NextGen and Research and Development Are Keys to Reducing Emissions and Their Impact on Health and Climate, May 6, 2008.

11 Revised *MEPA Greenhouse Gas Emissions Policy and Protocol*, Massachusetts Executive Office of Energy and Environmental Affairs, effective May 5, 2010.

12 These GHG are comprised primarily of carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), and three groups of fluorinated gases (i.e., sulfur hexafluoride [SF_6], hydrofluorocarbons [HFCs], and perfluorocarbons [PFCs]). GHG emission sources associated with airports are generally limited to CO_2, CH_4, and N_2O.

- Even though the *2009 EDR* is not subject to the MEPA GHG policy since it does not propose any discrete projects, Massport has voluntarily prepared an inventory of GHG emissions directly and indirectly associated with the Airport starting with the *2007 EDR*. For this assessment, the 2009 GHG emissions inventory includes aircraft operations within the ground-based taxi-idle/delay mode, up to the top of the 3,000–foot LTO cycle*)*. GHG emissions associated with GSE/APU, motor vehicles, a variety of stationary sources, and electricity usage were also included.
- Massport has direct ownership or control over a very small percentage of these GHG emissions and their sources (i.e., limited to Massport fleet vehicles, stationary sources, and electrical consumption within Massport buildings). The vast majority of the emission sources are owned or controlled by the airlines, other airport tenants, and the general public.

This work was accomplished following the EEA guidelines and uses widely-accepted emission factors that are considered appropriate for this application, including International Organization for Standardization (ISO) New England electricity-based values. The analysis of GHG emissions presented is also consistent with the April 2009 guidance issued by the ACRP with the exception that aircraft cruise mode emissions above 3,000-foot LTO cycle were not included.

GHG emissions were categorized by ownership and control: emissions related to Massport activities were assigned to the Massport category, emissions related to airport tenants were assigned to the tenant category and emissions related to the public were assigned to the public category. These three categories (identified in Table 7-13) are characterized by the degree of control that the airport operator (Massport) has over the emissions.[13]

- Category 1 – GHG emissions from sources that are owned and controlled by the reporting entity (e.g., Massport). Category 1 typically represents sources which are owned by the entity, or sources which are not owned by the entity, but over which the entity can exert control. At Logan Airport, these sources include airport-owned and controlled stationary sources (e.g., boilers, generators, etc.), fleet vehicles, and purchased electricity. On-airport ground transportation and off-airport employee vehicle trips are included as Category 1 emissions as they are somewhat controlled by the airport.
- Category 2 – This category comprises sources owned and controlled by airlines and airport tenants, and can include aircraft (on-ground, within the LTO up to 3,000 feet, GSE/APU, electrical consumption, and employee vehicles.
- Category 3 – This category generally comprises GHG emissions associated with passenger vehicles. These include public automobiles, taxis, limousines, buses, shuttle vans, etc. operating on the off-airport roadway network.

Once the ownership boundaries are determined, the operational boundaries are also set, reflecting the Scope and reflecting the ownership of the emission source. Three Scopes are also identified in Table 7-13 and include:

- Scope 1 / Direct – GHG emissions from sources that are owned and controlled by the reporting entity (e.g., Massport) such as stationary sources and airport-owned fleet motor vehicles.
- Scope 2 / Indirect – GHG emissions associated with the generation of electricity consumed by the reporting entity (e.g., Massport).

13 ibid.

- Scope 3 / Indirect and Optional – GHG emissions that are associated with the activities of the reporting entity (e.g., Massport), but are associated with sources that are owned and controlled by others. These include aircraft-related emissions, emissions from airport tenant's activities, as well as ground transportation to and from the airport.

Table 7-13 Ownership Categorization and Emissions Category/Scope

Owning/Controlling Entity Categories	Source	Category/Scope
Massport Owned and/or Controlled	Massport Fleet Vehicle	Category 1/Scope 1
	On-airport Ground Transportation	Category 1/Scope 1
	Off-airport Employee Vehicle Trips	Category 1/Scope 3
	On-airport Parking Lots	Category 1/Scope 1
	Stationary Sources (includes generators, boilers, etc.)	Category 1/Scope 1
	Fire Training	Category 1/Scope 1
	Electrical Consumption	Category 1/Scope 2
Tenant Owned and/or Controlled (includes airlines, government, concessionaires, aircraft operators, fixed-based operators, etc.)	Aircraft (on-ground, within the LTO up to 3,000 feet)	Category 2/Scope 3
	Auxiliary Power Units	Category 2/Scope 3
	Ground Support Equipment	Category 2/Scope 3
	Off-airport Employee Vehicle Trips	Category 2/Scope 3
	Electrical Consumption	Category 2/Scope 2
Public Owned and Controlled	Off-airport Vehicle Trips (Includes private automobiles, taxis, limousines, buses, shuttle vans, etc., operating on the off-airport roadway network)	Category 3/Scope 3

Note: Follows Airport Cooperative Research Program (ACRP) guidance.
LTO Landing and Takeoff

As required by MassDEP, on June 14, 2010, Massport submitted a 2009 GHG emissions inventory for the Massachusetts GHG Emissions Reporting Program. This inventory included those sources meeting the criteria for Category 1 and Scope 1 (i.e., only those sources under the direct ownership and control of Massport). The GHG emissions inventory included in this *2009 EDR* is consistent with the data provided to MassDEP. However, the *2009 EDR* GHG emissions inventory is more comprehensive as it covers the full scope of GHG emissions at Logan Airport including those from tenants and the public, consistent with ACRP guidance.[14]

Table 7-14 presents the 2009 GHG emissions inventory reported in CO_2 equivalent values.[15] Massport-related emissions represent only 11 percent of total GHG emissions at the Airport. Tenant-based emissions represent 71 percent, electrical consumption from both Massport and tenants represents 13 percent, and passenger vehicle emissions represent 5 percent of total GHG emissions. Aircraft represents the largest source of emissions followed by motor vehicles and electricity generation. Total 2009 GHG emissions were 14 percent lower than 2008 levels.[16] Massport plans to update the GHG Emissions Inventory for Logan Airport annually.

14 However, aircraft cruise mode emissions above the 3,000-foot LTO cycle were not included.
15 CO_2 equivalent values are based upon the Global Warming Potential values of 1 for CO_2, 25 for CH_4, and 298 for N_2O (based on a 100 year period) as presented in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, *2007*.
16 For comparison purposes, the same method was used to calculate 2009 GHG emissions as was used to calculate the 2008 GHG emissions.

Table 7-14 Estimated 2009 Greenhouse Gas Emissions Inventory (in MMT of CO_2eq) at Logan Airport[1]

Source	Category	Scope	CO_2	N_2O	CH_4	Totals
Massport Emissions						
Ground Support Vehicles[2]	1	1	<0.01	<0.01	<0.01	<0.01
Massport Shuttle Bus	1	1	<0.01	<0.01	<0.01	<0.01
On-Airport Roadways[3]	1	1	0.02	<0.01	<0.01	0.02
Off-Airport Roadways (Employees)[4]	1	3	<0.01	<0.01	<0.01	<0.01
Parking Lots	1	1	<0.01	<0.01	<0.01	<0.01
Stationary Sources[5]	1	1	0.03	<0.01	<0.01	0.03
Total Massport Emissions (11%)			**0.06**	**<0.01**	**<0.01**	**0.06**
Tenant Emissions						
Aircraft – Ground[6]	2	3	0.18	<0.01	<0.01	0.18
Aircraft - Ground to 3000 feet[7]	2	3	0.16	<0.01	<0.01	0.17
Aircraft Engine Startup	2	3	<0.01	<0.01	<0.01	<0.01
Ground Support Equipment	2	3	0.02	<0.01	<0.01	0.02
Auxiliary Power Units	2	3	0.01	<0.01	<0.01	0.01
Off-Airport Roadways (Employees)[4]	2	3	0.02	<0.01	<0.01	0.02
Total Tenant Emissions (71%)			**0.39**	**<0.01**	**<0.01**	**0.40**
Massport/Tenant Emissions						
Purchased Electricity[8]	1 & 2	2	0.07	<0.01	<0.01	0.07
Total Airport/Tenant Emissions (13%)			**0.07**	**<0.01**	**<0.01**	**0.07**
Passenger Vehicle Emissions						
Off-Airport Roadways[4]	3	3	0.03	<0.01	<0.01	0.03
Total Passenger Vehicle Emissions (5%)			**0.03**	**<0.01**	**<0.01**	**0.03**
Total Logan Airport Emissions[9]			**0.55**	**<0.01**	**<0.01**	**0.56**
Percent of Statewide Totals[10]			<1.0%	<1.0%	<1.0%	<1.0%

Note: Table 7-14 does not provide a comparison to 2008 GHG emissions because the 2008 inventory uses a different method for calculating GHG emissions.

1 MMT - million metric tons of CO_2 equivalents (1 MMT = 1.1M Short Tons). CO_2 equivalents (CO_2eq) are bases for reporting the three primary GHGs (e.g., CO_2, N_2O, and CH_4) in common units. Quantities are reported as "rounded" and truncated values for ease of addition.

2 Ground Support Vehicles include the Logan Airport fleet. Emissions were calculated based on fuel usage.

3 On-airport roadways based on on-site vehicle miles traveled (VMT) and includes all vehicles.

4 Off-site roadways based on off-site Airport-related VMT and an average round trip distance of 60.2 miles (2003 Passenger Ground Access Survey).

5 Other sources include Central Heating and Cooling Plant, emergency generators, snow melters, and live fire training facility.

6 Aircraft – Ground emissions include taxi-in, taxi-out and ground-based delay emissions.

7 Aircraft – Ground to 3,000 feet include takeoff, climbout, and approach emissions up to a height of 3,000 feet (as specified by the ACRP guidance).

8 Emissions from electrical consumption occur off-airport at power generating plants. For the *2010 EDR*, Airport and Tenant electrical usage will be reported separately.

9 Total Emissions = Airport + Tenant + Public.

10 Percentage based on relative amount of total emissions to statewide total from World Resources Institute (cait.wri.org).

Updates on Other Air Quality Initiatives

This section highlights other air quality initiatives at Massport in 2009.

Massachusetts Department of Public Health Study

In 2004, the Massachusetts Legislature appropriated funds for the Department of Public Health (DPH) to undertake an assessment of potential health impacts of Logan Airport in the East Boston section of the city and any other communities located within a five-mile radius of the Airport. With the focus on noise and air quality, this study is currently underway and consists of an epidemiological survey combined with computer modeling of noise levels and air pollution concentrations. Massport has cooperated in this effort by providing DPH with Airport operational data in support of the assessment. DPH had anticipated completing this report in late 2008, but it has been delayed due to funding limitations. Recently, Massport agreed to provide funding towards the completion of this study.

Massport Air Quality Monitoring Study

Massport is undertaking a $1.6 million air quality monitoring study in and around Logan Airport in compliance with its MEPA Section 61 findings for the centerfield taxiway component of the Logan Airside Improvements Project. The study gathers air quality data in the communities around Logan Airport before and after the centerfield taxiway is operational, with an emphasis on ambient (i.e., "outdoor") levels of particulate matter and hazardous air pollutants (HAPs). The intent of the study is to assess air quality changes related to the operation of the new taxiway. Massport worked cooperatively with MassDEP and DPH to develop the scope of the monitoring study. This monitoring study is independent of, and in addition to, the long-term Measured NO_2 Concentrations Program discussed earlier in this chapter.

Air monitoring commenced on schedule during the summer of 2007 at ten different stations located on and off the Airport. The monitoring was comprised of both "real-time" and "time-integrated" monitoring methods, and includes measurement of fine particulates, VOC, carbonyls, black carbon, and polynuclear aromatic hydrocarbons (PAHs). Massport meets periodically with MassDEP and DPH regarding the progress and results of the air monitoring.

The first year of the two-year study was completed September 2008 and the report is posted on Massport's website. The second phase of the study will begin in September 2010 now that the centerfield taxiway is fully constructed and operational. Further details on the Massport Air Quality Monitoring Study can be found on Massport's website at
http://www.massport.com/environment/environmental_reporting/Documents/aq_work_plan.pdf.

Single Engine Taxiing

Massport supports the goal of reducing emissions and noise on the airfield. Single engine taxiing is one measure that appears promising and is being used by air carriers today. As a result, Massport supports the use of single engine taxiing, when it can be done safely, voluntarily and at the discretion of the pilot. Massport has conducted two surveys of Logan Airport air carriers (2006 and 2009) to understand the extent single engine taxiing is used at Logan Airport. Massport also issued a letter to air carriers in support of single engine taxiing when consistent with safety procedures in 2006. In addition, Massport is an active member of the FAA Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program on reducing noise and emissions. In 2009, Massport offered to facilitate the undertaking by the Massachusetts Institute of

Technology (MIT) of a more detailed survey of pilots at Logan Airport to better understand the use of single engine taxiing. MIT completed its survey and issued a paper in March 2010 (provided in *Appendix L, Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations*). The MIT survey confirms earlier Massport survey findings that single engine taxiing is an important operational measure used by airlines to conserve fuel and is extensively used at Logan Airport. Based on the more detailed survey results, Massport will tailor future communication to airlines to further encourage the use of single engine taxiing, when safe to do so, within the Logan Airport operational context.

Logan Airport Energy Planning

In an effort to reduce energy consumption and air emissions associated with the Central Utility Plant, Massport commissioned a study to evaluate operational, economic and environmental benefits through cogeneration.[17] In general, institutional, manufacturing, and large commercial facilities such as Logan Airport require both thermal energy (heat) and electricity. Traditionally, as is the case with Logan Airport, these products have been produced in two separate processes. Thermal energy is produced with a boiler while electricity is typically purchased from an electric utility or third party supplier, which generates power through a large central plant. By generating electricity alone, 67 percent of the available energy in the fuel is lost due to heat rejection and inherent system processing inefficiencies. By combining the two processes into one, the waste heat is captured and used as thermal energy. This process is referred to as cogeneration or a Combined Cooling, Heat and Power (CCHP) Plant. The potential benefits of developing a CCHP could enhance Logan Airport's energy profile by improving the operations of its Central Utility Plant to serve Logan Airport's thermal needs and a portion of its electrical requirements. The cogeneration study identified five different potentially feasible options for a CCHP that could satisfy the needs of the Airport and reduce its energy consumption Airport-wide. Massport is currently reviewing the results of this study.

In 2009, Massport began preparing an Energy Master Plan for all Massport facilities. The planning process involved data collection and establishing regulatory targets and baselines. One of the goals of the Energy Master Plan is to help Massport meet the State's Leading by Example Clean Building Targets [18], which by 2012, aim to reduce GHG from state-controlled buildings by 25 percent, reduce energy intensity at state-owned and leased buildings by square foot by 20 percent, and procure 15 percent of energy through renewable energy sources. The Energy Master Plan will provide Massport with a comprehensive strategy to reduce energy use using a portfolio of achievable measures that will result in quantifiable energy savings and cost reduction. Progress on the Energy Master Plan will be reported in the *2010 EDR*.

Southwest Service Area Redevelopment Program

The principal feature of the SWSA Redevelopment Program is a proposed Consolidated Rental Car Facility (ConRAC) and associated functions. The ConRAC will consolidate on-airport rental car operations and facilities into one integrated user-friendly facility in order to better serve both the tenants and the traveling public, and reduce ground transportation and air quality impacts on-Airport and off-Airport in the surrounding neighborhoods. The ConRAC will be designed, constructed and operated to be eligible for Leadership in Energy and Environmental Design® (LEED) certification (striving to achieve a LEED Silver

17 *Logan International Airport Energy Strategic Plan*, prepared for Massport, prepared by Source One, February 2008.
18 Massachusetts' *Leading By Example Program* is intended to reduce the environmental impacts of state government buildings and operations. The program includes energy efficiency standards for state buildings, such as clean energy and greenhouse gas goals, and as well as sustainable practices such as waste reduction, water conservation, and recycling.

rating or better) and to meet the Massachusetts LEED Plus sustainable design and construction standards established by the Commonwealth's Executive Office for Administration and Finance.[19]

By constructing a consolidated rental car facility on-Airport, the ConRAC will reduce the need for the rental car operators to shuttle vehicles from off-Airport storage locations, resulting in fewer vehicle miles travelled and lower air emissions (including mobile source GHG emissions) within the East Boston community, Route 1A, and adjacent neighborhoods. Through the implementation of the Unified Bus System, the new ConRAC will facilitate the reduction of the current rental car shuttle bus fleet by 70 percent and the associated VMTs, and air emissions. The Unified Bus System will use clean fuels (CNG and clean diesel-electric hybrid), further reducing emissions compared to the existing bus fleet. Also, the Unified Bus System includes combining the rental car shuttle bus service with existing Massport buses that service the MBTA Blue Line Airport Station (routes 22/33/55), resulting in further decreases to the size of the overall bus fleet serving the Airport, and reduced VMT and air emissions. Other air quality benefits of the SWSA Redevelopment Program include the reduction of curb-side congestion at the main terminal complex through implementation of the Unified Bus System and reduced overall energy demand (and associated stationary source GHG emissions) through improved building energy design.

On May 28, 2010, the Secretary of EEA issued a Certificate that determined that the project adequately and properly complies with MEPA. *Chapter 3, Airport Planning* provides detail on the environmental and operational benefits of the SWSA Redevelopment Program related to the consolidation of ground transportation facilities and services, and traffic circulation and access improvements. Initial site preparation projects are underway at the time of this report filing.

Engagement in Aviation-Related Environmental Issues

Massport maintains memberships and active participation in a number of organizations involved in addressing aviation-related environmental issues, including air quality. These include serving on environmental committees for the TRB, AAAE, ACI, and Women's Transportation Seminar (WTS) and symposia.

Statewide, National and International Initiatives

Advancements on the national and international levels to decrease Airport-related air emissions focused primarily on three initiatives in 2009: the advanced quantification of PM and HAPs emissions from aircraft engines, the continued phasing-in of AFV, and the implementation of GHG emissions reduction strategies. These initiatives are briefly described below.

- **Particulate Matter and Hazardous Air Pollutant Research**—Conducted by the FAA/National Aeronautics and Space Administration (NASA)/EPA and others, research continues to better characterize PM and HAPs emissions from aircraft engines and to assess their potential health effects.[20] Similarly, air quality monitoring efforts at other airports are also underway (or planned) at various locations to advance what is known about ambient ("outdoor") levels of air pollutants in the vicinities of the nation's airports.[21] In

19 According to Executive Order 484, titled "Leading by Example: Clean Energy and Efficient Buildings," all new construction and significant renovation projects for state government buildings over 20,000 square feet must meet the Massachusetts LEED* Plus green building standard.
20 Aircraft Particle Emissions eXperiment (APEX), www.nasa.gov/centers/glenn/aeronautics/APEX.html.
21 These air quality monitoring programs at other airports include T.F. Green Airport (Providence, R.I.); Teterboro Airport (N.J.); and Los Angeles International, Van Nuys, and Santa Monica Airports in CA.

addition to conducting its own air monitoring programs (see updates on the Measured NO_2 Concentrations Report and Massport Air Quality Monitoring Study, above), Massport continues to closely track these issues through its involvement in aviation industry organizations such as ACI and AAAE.

- **Alternative Fuel Vehicle Conversions**—Airlines and other GSE users are continually replacing their older fossil-fueled vehicles and equipment with more fuel-efficient, low- and non-emitting (e.g., electric) technologies. Airport-fleet vehicles are also being converted to alternative fuels (e.g., propane). In response, GSE and automobile manufacturers are offering a wider selection of AFVs, many of which are designed specifically for airport use. Massport fully supports conversion of fossil-fueled vehicles and equipment to alternative fuels. For example, in 2009, Massport issued a $3 million loan to Delta Air Lines to purchase a full fleet of electric GSE including 50 electric baggage cart tugs, 25 electric baggage conveyor belt vehicles, and charging stations for each vehicle. This will help to significantly reduce emissions and improve the air quality at Logan Airport.
- **Participation in Massachusetts Climate Protection Plan**—Massport was one of 15 state agencies and authorities that participated in the development of the state's Climate Protection Plan: the Commonwealth's initial step towards reducing GHG. Massport is participating on two of the Plan's teams: Transportation System Planning and Transportation Technologies and Operations, with a focus in GHG emission reductions associated with Airport operations. Current reduction strategies include:
  - Include energy use and GHG emissions as criteria in transportation decisions;
  - Maintain and update public transit systems;
  - Expand programs to promote efficient travel;
  - Seek opportunities to reduce emissions at Logan Airport;
  - Improve aircraft movement efficiency;
  - Promote the use of cleaner vehicles and fuels in public transit fleets;
  - Continue to promote the use of clean diesel equipment on publicly-funded construction projects;
  - Eliminate unnecessary idling of buses; and
  - Advocate for aircraft efficiency at regional and national levels.

In August 2008, the Commonwealth passed the Global Warming Solutions Act (GWSA). The GWSA requires the reduction of GHG emissions by 80 percent from 1990 levels by 2050, with a reduction of up to 25 percent by 2020. In response to the GWSA, the Commonwealth established 12 working groups, including five with a transportation focus. The working groups were tasked with outlining strategies to achieve statewide GHG reductions and developing cost-effective approaches. Advisory committees on mitigation and adaptation were formed. Massport is participating in meetings primarily focused on reducing energy demand (mitigation) through transportation and building energy efficiencies, incentives to increase passengers per vehicle, and opportunities for alternative (low-emitting) fuels for use within the transportation sector. Planning meetings commenced in early June 2009 and are ongoing.

On a parallel track, to address adaptation, the Commonwealth also commenced a Climate Change Adaptation project. An Advisory Committee was established to define and assess potential state-wide vulnerabilities associated with potential climate change impacts, and evaluate strategies for adapting to the predicted effects of climate change.

In this ongoing effort, beginning in October 2009, Massport participated in the transportation sector meetings of the "Key Infrastructure" working group. In addition to considering potential impacts to Massport and other statewide maritime facilities, the Key Infrastructure team looked at potential issues at airports related to service disruption, access issues, flooding, and other storm-related impacts. The initial Advisory Committee report is expected in late 2010, and will be documented in the *2010 EDR*.

8

Water Quality/ Environmental Compliance and Management

Introduction

The Massachusetts Port Authority's (Massport) approach to environmental management and compliance is a key component of its commitment to sustainability at Logan Airport (refer to *Chapter 1, Introduction/Executive Summary* for details). Through monitoring and documentation, environmental performance is assessed, allowing policies and programs to be developed, implemented, evaluated, and improved.

Massport's primary water quality goal is to prevent or minimize pollutant discharges, thus limiting adverse water quality impacts associated with airport activities. Massport employs several programs to promote awareness of Massport and tenant activities that may impact surface and groundwater quality, including implementing best management practices (BMPs) for pollution prevention by Massport, its tenants, and its construction contractors. In addition, Massport voluntarily participates in the State's Leading by Example Program,[1] continuing its commitment to operate Logan Airport in an environmentally sound manner. Massport complies with the Massachusetts Contingency Plan (MCP) by monitoring fuel spills and tracks the status of spill response actions. The MCP, codified as 310 Code of Massachusetts Regulations (CMR) 40, lays out a set of regulations that govern the reporting, assessment, and cleanup of spills of oil and hazardous materials in Massachusetts. Massport also maintains a Tank Management Program, which includes a tank permitting, monitoring, upgrade, and replacement program. Information on Massport's Logan Airport Stormwater Pollution Prevention Plan (SWPPP), Spill Prevention Control and Countermeasure plan (SPCC), and the MCP are provided in this chapter.

1 Massachusetts' *Leading By Example Program* is intended to reduce the environmental impacts of state government buildings and operations. The program includes energy efficiency standards for state buildings, such as clean energy and greenhouse gas goals, and as well as sustainable practices such as waste reduction, water conservation, and recycling.

The federal Clean Water Act (CWA) requires permits for pollutant discharges into United States (U.S.) waters from point sources and for stormwater discharges associated with industrial activities. Massport holds permits under the U.S. Environmental Protection Agency's (EPA) and Massachusetts Department of Environmental Protection's (MassDEP) National Pollutant Discharge Elimination System (NPDES) Program. The NPDES permit covers Massport and tenant co-permittees at Logan Airport. It establishes effluent limitations and monitoring requirements for discharge from specified stormwater outfalls.

Massport is responsible for ensuring compliance with applicable state and federal environmental laws and regulations. Massport promotes appropriate environmental practices through pollution prevention and remediation measures. Massport also works closely with tenants in an effort to improve tenant compliance. Massport's environmental programs pertaining to water quality and environmental compliance and management include:

- Stormwater management;
- Water quality management;
- Fuel Use and Spills;
- MCP compliance;
- Storage tank compliance;
- Compliance auditing and inspections;
- Environmental Management System (EMS) implementation; and
- Clean State Initiative and Leading by Example Program participation.

Key Findings

The following summarizes the key water quality and compliance findings for 2009:

- In 2009, there were six reportable oil and hazardous material spills. Further details on spills can be found in the *Fuel Use and Spills* section of this chapter.
- Massport received a Notice of Noncompliance (NON) from the MassDEP on September 18, 2009. The NON listed a total of 13 stormwater discharge samples that exceeded permit limits in the period since the NPDES permit was issued in July 2007. In response to the NON, Massport implemented corrective actions throughout the Airport directed at specific issues identified in the NON, as well as generally reviewing and updating standard practices at the Airport.
- One outfall sample out of a total of 72 samples at the Maverick Street outfall exceeded the regulatory limits of the NPDES Program permit for the North, West, and Maverick Street outfalls. This exceedance was reported during March 2009, as required.
- Massport's SWPPP addresses stormwater pollutants in general, and also addresses deicing and anti-icing chemical, potential bacteria, fuel and oil, and other sources of stormwater pollutants. The 2009 Annual Certificates of Compliance were submitted to EPA and MassDEP on December 28, 2009, for Massport and each co-permittee.
- In accordance with the requirements of the NPDES permit for Logan Airport, Massport conducted a water quality study to evaluate the potential biological, chemical, and toxicological impacts of deicer discharges on Boston Harbor. The study concluded that deicer discharges do not negatively impact dissolved oxygen

levels in the harbor, do not contain materials in concentrations over water quality criteria or toxicological benchmarks, and do not adversely affect the designated uses of the receiving waters.

- In accordance with the MCP, Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. Massport is working towards achieving regulatory closure of the remaining MCP sites:
  - RTN: 3-10027: Phase V Remedy Operations Plan submitted March 3, 2010.
  - RTN: 3-23493: RAO-A3 submitted January 1, 2010.
  - RTN: 3-28199: Phase I/Tier Classification submitted December 14, 2009.
  - RTN: 3-1287: Post RAO-C Status Reports submitted in May and June 2009, and RAM Status Reports submitted in February and September for the BOSFUEL fuel line replacement project.
  - RTN 3-28792: Release notification form submitted to MassDEP/Boston Water and Sewer Commission (BWSC) on October 8, 2009.

- Preparation of the EMS for facilities where fleet and field maintenance activities are conducted was on-going in 2009. International Organization for Standardization (ISO) 14001 certification was obtained for Facilities II (vehicle maintenance, landscaping, and snow removal) in December 2006 and recertified in December 2009. ISO 14001 certification for Facilities I (Central Heating and Cooling Plant) and Facilities III (Electrical and Structural) is scheduled for 2010.

Stormwater Management

On July 31, 2007, EPA and MassDEP issued a new NPDES permit for Logan Airport's stormwater outfalls (NPDES Permit MA0000787). The new permit became effective on September 29, 2007, replacing the previous NPDES Permit dated March 1, 1978. The NPDES permit is on EPA's website at: www.epa.gov/NE/npdes/logan/pdfs/finalma0000787permit.pdf. Massport holds a separate NPDES permit for the Fire Training Facility (NPDES Permit MA0032751). The following sections describe the requirements of the two permits, and Massport's compliance with these requirements.

Stormwater Outfall NPDES Permit Requirements and Compliance

The following sections describe stormwater outfalls that are subject to the NPDES Permit, describe the monitoring requirements, and the monitoring results.

Outfalls Subject to the NPDES Permit

The NPDES permit regulates stormwater discharges from the North, West, Northwest, Porter Street, and Maverick Street Outfalls, and all of the airfield outfalls. The areas drained by the outfalls are the North Drainage Area (152 acres); West Drainage Area (557 acres); Northwest Drainage Area (23 acres); Porter Street Drainage Area (130 acres); Maverick Street Drainage Area (34 acres); and the Airfield Outfall Drainage Areas (A1 through A44) which drain the remainder of the airfield including runways, taxiways, and the perimeter roadway (910 acres). The North and West Drainage Areas also drain a portion of the airfield. These drainage areas are shown in Figure 8-1 and further detailed in Table 8-1. The North and West Outfalls have end-of-pipe pollution control facilities for the removal of debris and floating oil and grease from stormwater prior to discharge into Boston Harbor.

Table 8-1 Stormwater Outfalls Subject to NPDES Permit Requirements

Outfall Name and Number	Drainage Area (Acres)	Boston Harbor Discharge Location	Major Land Uses
North (001)	152	Wood Island Bay	Terminal E, apron, taxiway, cargo areas, fuel farms, and runways
West (002)	557	Bird Island Flats	Taxiways, terminal areas, aprons, cargo areas, and runways
Porter Street (003)	130	Bird Island Flats	Hangars, vehicle maintenance facilities, cargo areas, car rental facilities, and roadways
Maverick Street (004)	34	Jeffries Cove	Car rental facilities, taxi/bus/limousine pools, parking areas, flight kitchens
Northwest (005)	23	Wood Island Bay	Flight kitchen, vacant area being used for construction lay down and staging
Airfield (A1 through A44)[1]	910	Perimeter of Airfield	Runways, taxiways, and perimeter roadway

1 In accordance with the requirements of the NPDES permit, Massport developed an Airfield Stormwater Outfall Sampling Plan (March 27, 2008). The Plan requires quarterly wet weather sampling at a minimum of seven of the airfield outfalls (A1 through A44) in order to obtain representative samples of the quality of stormwater runoff from the airfield.

Monitoring Requirements

The NPDES permit requires grab samples (single samples collected at a particular time and place) to be taken monthly from the North, West, Porter Street, and Maverick Street Outfalls. Samples are tested for pH, oil and grease, total suspended solids (TSS), benzene, surfactants, fecal coliform bacteria, and enterococcus bacteria during both wet and dry weather. Grab samples were also taken quarterly from these four outfalls during wet weather to test for eight different polycyclic aromatic hydrocarbons (PAHs). Additional sampling requirements of the NPDES permit include sampling for deicing compounds twice during the deicing season (October through April) at the North, West, and Porter Street Outfalls. The NPDES permit sets discharge limitations for pH, oil, and grease, and TSS from the North, West, and Maverick Street outfalls and for pH from the Porter Street outfall. The NPDES permit does not include any discharge limitations for the Northwest Outfall, airfield outfalls, or the deicing monitoring, and requires only that the sampling results be reported. *Appendix J, Water Quality/ Environmental Compliance and Management* contains additional information on the sampling requirements of the NPDES permit.

Figure 8-1 Logan Airport Outfalls

Notice of Noncompliance
Massport received a NON from the MassDEP on September 18, 2009. The NON listed a total of 13 stormwater discharge samples that exceeded permit limits in the period since the NPDES permit was issued in July 2007. The number of samples that exceeded the limits represented 2.6 percent of the total number of stormwater discharge samples analyzed during that time period. In response to the NON, Massport implemented corrective actions that included the following:

- Met with tenant and Massport Facility personnel to review best management practices (BMPs);
- Conducted additional SWPPP inspections at Massport and tenant-operated facilities;
- Inspected and cleaned catch basins and installed filter inserts;
- Continued extensive pavement sweeping program and maintenance of outfall pollution control equipment; and
- Directed tenant Swissport to implement upgrades to its stormwater treatment system at the Fuel Storage Facility.

Monitoring Results
Stormwater samples taken at the Maverick Street Outfall on March 9, 2009, exceeded both the 100 milligrams per liter (mg/L) daily maximum limit for TSS and the 15 mg/L daily maximum limit for oil and grease. The analytical results for the samples indicated a concentration of 230 mg/L for TSS and 26 mg/L for oil and grease. The drainage area discharging to the Maverick Street Outfall, which is located within Logan Airport's Southwest Service Area (SWSA), is comprised of paved areas and building and contains car rental facilities, and parking for buses and limousines. Heavy sanding of these paved areas during storm events in March is believed to have contributed to the exceedance. Massport took immediate measures to address the exceedance including: requiring car rental agencies to inspect and replace filter fabric at catch basins and mechanical sweeping of parking areas within the Maverick drainage area to remove sediment. There were no exceedances reported at the North and West Outfalls. The highest concentrations observed at the Porter Street outfalls were 19 mg/L of oil and grease (October 7, 2009) and 140 mg/L of TSS (February 2, 2009).

The NPDES permit requires only that sampling results be reported for the Northwest Outfall and airfield outfalls. The highest concentrations observed at the Northwest Outfall were less than 4.4 mg/L of oil and grease (February 22, 2009 and September 27, 2009) and 83 mg/L of TSS (November 20, 2009). The highest concentrations observed at the airfield outfalls were 13 mg/L of oil and grease and 280 mg/L of TSS on November 20, 2009.[2] Deicing sampling at the North, West, Porter Street, and airfield outfalls occurred in January and March 2009 (see Tables J-12 and J-13 in *Appendix J, Water Quality/Environmental Compliance and Management).*

The NPDES water quality monitoring results are posted on Massport's website (www.massport.com/logan/airpo_water_outfa.html), and Massport provides copies of the monitoring results to EPA and MassDEP.

2 The 2008 NPDES permit does not set maximum daily discharge limitations for the Runway/Perimeter Stormwater Outfalls.

Due to the large size of the drainage areas and relatively low concentration of pollutants, it is not always possible to trace exceedances to specific events. Where a known event, such as a spill, is reported, Massport routinely checks the drainage system for impacts from the event and takes corrective actions if necessary. The 2009 water quality monitoring results for discharge from the outfalls is provided in *Appendix J, Water Quality/ Environmental Compliance and Management,* along with the history of water quality monitoring results that dates back to 1993.

Logan Water Quality Study

In 2009, Massport completed a water quality study that evaluated the potential impacts from deicer runoff on water quality in Boston Harbor as required in the Logan Airport Stormwater Outfall NPDES permit. The overall goal of the study was to conduct a "biological, chemical, and toxicological analysis of Logan Airport's stormwater discharges and the resultant receiving water quality in order to characterize the impacts of deicer contained in stormwater discharges" and conduct an assessment "of the ability of the receiving waters to meet their designated uses, including an assessment of impacts to aquatic life and fishing, shellfishing, and recreation." Based on the analyses conducted in this water quality study, the following conclusions were reached:

- The discharge of stormwater containing deicing materials does not negatively impact receiving water dissolved oxygen concentrations;
- The stormwater discharges do not contain materials in concentrations in excess of established water quality criteria or available toxicity benchmarks; and
- The discharges do not adversely affect the designated uses (SB, SB/CSO) of the receiving waters.[3]

The study was submitted to EPA and MassDEP in September 2009 in compliance with the NPDES permit requirements.

Stormwater System Inspections and Repairs

Beginning in 2006, Massport conducted inspections of the sanitary sewer and stormwater drainage system across Logan Airport in order to document the condition of the systems and identify potential impacts from the sewer to the stormwater drainage system. Such impacts could result from leaks or breaks from the sanitary sewer or from direct, inadvertent, illegal cross connections to the stormwater drainage system. The following work was completed in 2009:

- Updated mapping, cleaned, and inspected 1,570 sanitary sewer and stormwater drainage structures.
- Cleaned and inspected via an in-pipe TV camera, approximately 28,000 linear feet of sanitary sewer.
- Dye-tested suspect portions of the sanitary sewer as well as the sewer service lines at several buildings.

Due to the stormwater discharge exceedance at the Maverick Street Outfall in March, and the NON that was issued by MassDEP on September 11, 2009, Massport and its tenants implemented a comprehensive inspection

3 Class SB waters are designated as a habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. A Combined Sewer Overflow (CSO) is any intermittent overflow, bypass or other discharge from a municipal combined sewer system which results from a wet weather flow in excess of the dry weather carrying capacity of the system.

program to identify drainage structures (i.e., catch basins and manholes) that contained excessive sediment, and/or exhibited evidence of petroleum impacts, which may have contributed to the discharge exceedance. As documented in Massport's October 21, 2009, and January 19, 2010, submittals to MassDEP updating the corrective actions taken in response to the NON, a total of 80 catch basins were inspected, cleaned and equipped with filter inserts within the Maverick Outfall drainage area. This work was completed by Massport and its tenants.

The comprehensive sewer inspection identified deficiencies including:

- An accidental cross connection to the stormwater drainage system at Terminal B;
- A fully collapsed sewer in front of Terminal C and a collapsed sewer service line at Cargo Building 63;
- Several surcharged sewer manholes indicating clogged pipes. Sediment and debris were removed from the sewers and storm drains; and
- Partially collapsed sewers along the North Airport Access Road and Prescott Street.

The above deficiencies were corrected, with the exception of the partially collapsed sewers that exist along the North Airport Access Road and Prescott Street, which were replaced by the BWSC in 2009.

Fire Training Facility NPDES Permit Requirements and Compliance

NPDES Permit No. MA0032751[4] regulates treated wastewater from the Fire Training Facility on Governors Island (Figure 8-1). The treated wastewater from fire training exercises is stored, treated by separation and a carbon filter to remove fuel contaminants, and is normally reused onsite. If no storage is available, treated wastewater is tested prior to discharge to the storm sewer to ensure compliance with the NPDES permit. Discharge monitoring reports are submitted monthly to EPA. In 2009, Massport reused all of the wastewater at the Fire Training Facility. Treated wastewater from the facility was discharged to the storm sewer in January 2010. The results of the laboratory analyses of wastewater indicated that all tested parameters were below the NPDES permit discharge limits.

Fuel Use and Spills

Management of fueling operations at Logan Airport is designed to minimize impacts on water quality through the implementation of Stormwater Pollution Prevention BMPs, including the use of reliable storage, secondary containment, and effective spill clean-up procedures. Massport's jet fuel storage and distribution infrastructure, installed in 2000 and 2001, includes a state-of-the-art, zoned leak detection system for underground fuel piping, which identifies volumetric changes of product in the pipe at operating pressure and zero pressure. The system combined the storage facility with a hydrant fuel system that reduced the need for trucks and dispensing. The former fuel farms were removed in 2000.

The fuel storage and distribution system was designed to ensure, to the extent technologically feasible, the reliable detection of leaks. The aboveground jet fuel storage facility and distribution system are leased and operated by a

4 NPDES Permit No. MA0032751 - *Logan International Airport Fire Training Facility*. Issued November 1, 2006.

single party, BOSFUEL, an airline consortium. The management of the facility by one entity was put in place to minimize potential fuel spills and maximize water quality protection for the storage and distribution facilities. Cathodic protection, leak detection, secondary containment, and tank overfill protection methods such as alarms, inventory gauging sensors in the tanks, and emergency fuel shut-off systems have been installed. The operation and maintenance of these controls have been included in the Operation and Maintenance Manual used by Swissport Fueling, BOSFUEL's contractor, to operate and maintain the facility. Built-in environmental controls, unified operations, and the ongoing contingency planning provide heightened environmental protection and more efficient fuel handling operations than the previous system. In 2007, in coordination with Massport, BOSFUEL prepared construction documents for replacing a portion of the fuel distribution system. Construction on the replacement pipeline began in spring 2008 and 90 percent of the project was completed before the 2008 to 2009 winter construction shutdown. The BOSFUEL fuel pipeline replacement project continued throughout 2009, with work being completed on pipeline connections, testing of the new fuel line, and abandonment of the old fuel line.

The Massport Fire Rescue Department keeps logs of all spills at Logan Airport (see Table 8-2). State environmental regulations require that oil spills of 10 gallons or more in volume be reported to MassDEP. Spills that enter storm drains of any volume must also be reported to Massport. Massport keeps records of all spills, including those less than the reporting threshold. In 2009, of the 95 oil and hazardous material spills reported to the Massport Fire Rescue Department, six spills (6 percent) were reportable. Of the six reportable spills, three commercial airlines were responsible for five of the spills and one fixed-based operator (fueler) was responsible for one spill. Jet fuel spills accounted for 91 percent of the total spills (51 jet fuel spills), with six of the jet fuel spills exceeding ten gallons. The remaining 44 spills (9 percent) involved gasoline, hydraulic oil, diesel fuel, and other substances, including one reportable spill of transmission fluid. A summary of Logan Airport jet fuel usage and spill records from 1990 to 2009, and greater detail pertaining to type and quantity of the spills can be found in *Appendix J, Water Quality/Environmental Compliance and Management*.

Table 8-2 Logan Airport Oil and Hazardous Material Spills[1] and Jet Fuel Handling

Year	Total Number of all Spills	Total Number of all Spills >10 gallons	Total Volume of all Spills (Gallons)	Estimated Volume of Jet Fuel Handled (Gallons)	Total Volume of Jet Fuel Spilled (Gallons)
2004	126	18	894	373,996,141	574
2005	97	15	2,319	368,645,932	585
2006	92	11	752	364,450,864	644
2007	108	7	604	367,585,187	361
2008	99	20	944	345,631,788	662
2009	**95**	**6**	**1004**	**327,358,619**	**915**

Source: Massport Fire Rescue Department.

1 Materials include: jet fuel, hydraulic oil, diesel fuel, gasoline, and other materials such as glycol and paint.
Oil and hazardous material spills and jet fuel handling data from1990 through 2009 is presented in *Appendix J, Water Quality/Environmental Compliance and Management.*

Tank Management Program

Since 1993, Massport has had a Tank Management Program in place that is designed to ensure that all Massport-owned tanks are in regulatory compliance with federal and state tank regulations. From 1993 through 2005, Massport completed six construction phases of storage tank modifications that included removal, replacement, and upgrades to existing tanks and related piping system in order to comply with federal and State tank regulations. In 2009, Massport installed a remote tank monitoring system for heating oil USTs located

at nine different Logan Airport buildings and hangars. This project included upgrading existing individual tank monitoring and leak detection systems at each location, and tying them all into one central monitoring station, to allow for continuous monitoring of inventory levels, as well as leak detection. As a BMP, Massport continues to upgrade older tanks and to monitor tank systems.

Massport is also implementing a successful tank release prevention strategy, which includes:

- A continuing program of monthly inspections and minor repairs of all Massport-owned tanks, related piping, and tank monitoring systems. Annual Stage II Vapor Recovery testing in June 2009, of Massport's underground storage tank and piping systems at five facility locations. Stage II Vapor Recovery Systems collect gasoline vapors from vehicles' fuel tanks when customers dispense gasoline products into their vehicles at gasoline dispensing facilities. The Stage II system uses special nozzles and coaxial hoses at each gasoline pump to capture vapors from vehicle fuel tanks during the refueling process and re-route them to the station's storage tank(s). Testing included replacement of defective hoses and/or nozzles, as needed.
- Annual inspections of all three of Massport's aboveground storage tanks greater than 10,000 gallons in volume.
- Review of all proposed tenant tank upgrades, installations, and tank removals (under the Tenant Alteration Application process) to ensure compliance with applicable state and federal regulations and with Massport policy.
- Ongoing upgrade and maintenance of a Geographic Information System (GIS) database that contains information on all storage tanks located on Massport property. For each tank, the database tracks location, permit status, compliance status with applicable tank regulations, and tank and monitoring system equipment summaries.

Massport also provides tenants with revised storage tank regulatory requirements and assists with tank permitting procedures.

Site Assessment and Remediation

The MCP (310 CMR 40), which is administered by the MassDEP, pertains to releases of oil or hazardous materials into the environment. The MCP prescribes the site cleanup process based on the nature and extent of the release's contamination. The MCP defines the roles for those parties affected by and potentially responsible for the release and establishes the release reporting program and submission deadlines for tracking events from initial release to regulatory closure.

In accordance with the MCP, Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. There are a number of phases for the investigation of contaminated sites. Phase I involves initial site investigations for the presence of contamination and Phase II assessments are more comprehensive site investigations. Phase III identifies, evaluates, and selects remediation actions and Phase IV involves the implementation of selected remedial actions. Phase V involves the operation, maintenance and/or monitoring of the remediation program. Massport leads the performance of a variety of response actions, including remediation at sites where Massport is the responsible party, where there are multiple responsible parties, and where no responsible party has been identified.

Table 8-3 describes Massport's progress in 2009 in achieving regulatory closure of the MCP sites identified in Figure 8-2.

Table 8-3 MCP Activities Status of Massport Sites at Logan Airport

Location (Release Tracking Number) and MassDEP Reporting Status	Action/Status
1. Fuel Distribution System (3-1287)	
Phase II Report filed in April 1997	Indicated fuel floating on the groundwater table in 10 discrete locations in the terminal areas; cleanup required to achieve regulatory closure.
Phase III Report filed in April 1997	Reported product recovery as the preferred cleanup alternative; none of the areas to be cleaned up by a responsible party (i.e., a tenant responsible for the contamination). Cleanup was anticipated to span a minimum of three years.
Phase IV Remedy Implementation Plan filed in March 1998	The plan described seven discrete locations of separate phase hydrocarbons (jet fuel floating on the groundwater) to be remediated at Terminals C and E as well as three discrete areas at Terminal B to be remediated by tenants who were responsible for the historic release. The remediation strategies that Massport undertook at the seven areas differed depending on the product thickness. Strategies included trench-based product recovery, multi-phase extraction, excavation and dewatering during construction, and passive remediation.
Phase V Inspection and Monitoring Status Reports filed in September 1998, March 1999, and October 1999	The Status Reports documented remedial actions at seven areas including passive recovery of separate phase hydrocarbons (SPH) at Areas 1, 6, and 7, and pumping to recover SPH at Area 3. Interim passive recovery was also implemented at Areas 2 and 4, pending the evaluation of active recovery systems. Remedial objective of less than1/2 inch of product has been met at Areas 1, 2, 5, 6, and 7, but monitoring continues. MCP closure will be achieved at these areas by applying for an AUL.
Tier II Extension Request submitted in March 2000	Site Closure was not achieved by the March 2000 deadline. A Tier II Extension Request was submitted, providing a plan for continued SPH recovery and monitoring until the remedial objective has been accomplished.
Response Action Outcome (RAO) Submitted March 2001	Under the Class C RAO, monitoring continues at this location along the fuel line for the presence of SPH.
Tier II Extension Request Submitted in July 2002	The Tier II Extension Request and RAM Plan were submitted prior to construction of the Baggage Screening Project in the area of the Fuel Distribution System.
2003	Massport submitted status reports detailing fuel recovery efforts along the distribution system.
2004	Massport submitted status reports to MassDEP detailing fuel recovery efforts along the distribution system in March and September 2004.
2005	Inspection and Monitoring Status Reports were submitted to the MassDEP in March 2005 and March 2006 detailing monitoring and product recovery efforts along the fuel distribution system during the period between September 2004 and September 2005.
2006	An Inspection and Monitoring Status Report was submitted to the MassDEP detailing monitoring and product recovery efforts along the Fuel Distribution System (FDS) between March and September 2006. Massport continues to review data for tightness testing of the fuel line, and completed leak testing of fuel hydrants pits adjacent to Terminal B and Terminal C. Massport continues to meet with the operator of the FDS, BOSFUEL, to assess conditions along the FDS at Terminal B and Terminal C, referred to as the Retained Facilities portion of the FDS, and to coordinate the replacement of the Retained Facilities.

Table 8-3 MCP Activities Status of Massport Sites at Logan Airport (Continued)

Location (Release Tracking Number) and MassDEP Reporting Status	Action/Status
1. Fuel Distribution System (3-1287) (continued)	
2007	Inspection and Monitoring Status Reports were submitted to the MassDEP detailing monitoring and product recovery efforts along the FDS between September 2006 and September 2007. A Periodic Evaluation Report was submitted in January 2008 which indicated that a Condition of No Substantial Hazard exists at the FDS and a permanent solution is not currently feasible. Massport is coordinating with BOSFUEL who are preparing construction documents for replacing a portion of the FDS. Construction will be conducted under a RAM Plan.
2008	Inspection and monitoring reports were submitted to the MassDEP detailing monitoring and product recovery efforts along the FDS between September 2007 and September 2008. Massport coordinated with BOSFUEL during construction to replace a portion of the FDS. The work was conducted under a RAM Plan that was submitted to the MassDEP in May 2008. A RAM Status Report was submitted in September 2008. Construction of the pipeline replacement is approximately 90 percent complete, and is expected to be completed in 2009.
2009 Update	*Inspection and monitoring reports were submitted to the MassDEP detailing monitoring and product recovery efforts along the FDS between September 2008 and September 2009. The BOSFUEL project to replace a portion of the FDS continued, with work being completed on pipeline connections, testing of the new fuel line, and abandonment of the old fuel line. RAM Status Reports for the BOSFUEL Project were submitted in February and September 2009.*
2. Citgo Service Station (3-2616)	
Phase II Report filed in April 1997	Indicated soil and groundwater contamination exists; cleanup required to achieve regulatory closure.
Phase III Report filed in April 1997	Identified various alternatives that could be implemented to achieve closure. Underground storage tanks were removed by the Central Artery/Tunnel (CA/T) Project during building demolition. Additional soil was removed during CA/T Project construction.
2002	Massport is preparing to close out this site following removal of petroleum-contaminated soil during CA/T project construction.
2003 and 2004	The CA/T Project has collected subsurface data necessary to close this site. Massport and the CA/T Project are evaluating the data and preparing the documentation required to close the site.
2005	The CA/T Project is preparing a final closure report for work that included excavating contaminated material in the area of the former Citgo Service Station.
2006	The CA/T Project completed a final closure report covering the former Citgo Service Station area.
2007	Based on the assessment provided in the final closure report, Massport submitted a Class A-2 RAO for this site in April 2007. No further action is required.
2008	MassDEP approved the delisting of this site in October 2008.
2009	*Project completed; no update for 2009.*

Table 8-3 MCP Activities Status of Massport Sites at Logan Airport (Continued)

Location (Release Tracking Number) and MassDEP Reporting Status	Action/Status
3. North Outfall (3-4837)	
Phase II and Phase III Reports filed in March 1997	Indicated petroleum contamination present at the site is likely the result of decades of airport operation; risk assessment reported no significant risk to human health, or to the aquatic and avian community.
RAO submitted in March 1998	Class C RAO using a Temporary Solution (periodic site monitoring and assessment); remediation steps included (not limited to) installation of a new fuel distribution system and decommissioning of certain fuel lines, and natural biodegradation processes; goal is to have petroleum contamination reduced to an area less than 1,000 square feet. Installation of the new fuel distribution system and decommissioning of sections of the old system are completed. Massport has initiated site evaluation to document the reduction of petroleum contamination following the decommissioning of the North Fuel Farm and fuel distribution system.
Post RAO C evaluation report submitted in December 2002	Massport has eliminated substantial hazards at this site and has submitted a Class C RAO statement. In accordance with applicable regulations, Massport will conduct a periodic evaluation at five-year intervals until a Permanent Solution has been achieved. The next periodic evaluation is scheduled for 2007.
2004	Evaluation report indicated that a "Condition of No Significant Risk" has not been achieved at this site. Massport will conduct another assessment in 2007.
2005	No change in status for 2005.
2006	Massport prepared the five-year review of the Class C RAO for this site, which was due in December 2007.
2007	Massport completed its five-year review of the Class C RAO and transmitted it to MassDEP in December 2007. It was determined that a "Condition of No Significant Risk" has not been achieved at this site at this time. The next five-year re-evaluation will be conducted in 2012.
2008	No change in status.
2009 Update	*No change in status.*
4. Former Robie Park (3-10027)	
2005	A Phase I was completed in 2005 with an RAO retraction. The RAO had been completed by the former property owner.
2006	No change in status for 2006.
2007	No change in status for 2007.
2008	A Phase II Scope of Work was prepared on May 9, 2008. A RAM Plan was submitted to MassDEP on September 16, 2008.
2009 Update	*Phase V Remedy Operation Status Plan submitted on March 31, 2010*
5. Former Robie Property (3-23493)	
2005	A Phase I was completed in 2005.
2006	No change in status for 2006.
2007	No change in status for 2007.
2008	A Phase II was submitted to MassDEP on October 21, 2008.
2009 Update	*A RAO-A3 was submitted on January 4, 2010.*

Table 8-3 MCP Activities Status of Massport Sites at Logan Airport (Continued)	
Location (Release Tracking Number) and MassDEP Reporting Status	**Action/Status**
6. Tomahawk Drive (3-27068)	
2007	Release notification form submitted in August 2007.
2008	A RAO-B1 was submitted to MassDEP on January 9, 2009. No further response actions required.
2009 Update	*No further response actions required.*
7. Fire Training Facility (3-28199)	
2008	Oral notification of release made to MassDEP/BWSC on December 10, 2008
2009 Update	*A Phase I/Tier classification was submitted on December 17, 2009.*
8. Southwest Service Area (28792)	
2009 Update	*Release notification form submitted to MassDEP/BWSC on October 8, 2009.*

Notes: This list includes Massport MCP sites only. Additional sites are the responsibility of Logan Airport tenants. Refer to Figure 8-2 for location of MCP sites.

AUL	Activity and Use Limitation	Phase I	Initial Site Investigation
MCP	Massachusetts Contingency Plan	Phase II	Comprehensive Site Assessment
RAM	Release Abatement Measure	Phase III	Identification, Evaluation, and Selection of Comprehensive Remedial Actions
RAO	Response Action Outcome	Phase IV	Implementation of Selected Remediation Action
SPH	Separate Phase Hydrocarbon	Phase V	Operation, Maintenance and/or Monitoring
FDS	Fuel Distribution System		

Figure 8-2 Massachusetts Contingency Plan Sites

Environmental Compliance and Management

Massport works to minimize environmental impacts at Logan Airport through ongoing programs and new initiatives. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable design principles.

> *"Massachusetts Port Authority (Massport) is committed to operate all of its facilities in an environmentally sound and responsible manner. Massport will strive to minimize the impact of its operations on the environment through the continuous improvement of its environmental performance and the implementation of pollution prevention measures, both to the extent feasible and practicable in a manner that is consistent with Massport's overall mission and goals."*

Massport's overall environmental compliance and management efforts address the following goals:

- Protect water quality Airport-wide;
- Protect groundwater resources;
- Protect surface water resources (Boston Harbor);
- Minimize air quality impacts;
- Protect resources during construction;
- Mitigate construction impacts;
- Reduce occurrences of fuel leaks and spills; and
- Preserve coastal resources adjacent to the Airport.

The progress report for environmental compliance and management in Table 8-4 summarizes Massport's mechanisms for implementing these goals and details where changes to these efforts occurred in 2009.

Clean State Initiative and Leading By Example Program

- In 2009, Massport continued its voluntary involvement with the Clean State Initiative which was established under Executive Order 350. Massport worked to identify, evaluate, and correct matters of environmental noncompliance. In 2009, Massport resolved all outstanding environmental matters under the Clean State Initiative and completed replumbing of stormwater/sanitary piping work in the Terminal B garage.
- On April 18, 2007, the Governor signed Executive Order 484, establishing the Leading by Example – Clean Energy and Efficient Buildings Program (known as the Leading by Example Program). Executive Order 484 supersedes Executive Order 438 which established the State's former Sustainability Program. The Leading by Example Program was created to help state agencies minimize the environmental impacts of their operations and activities and to promote innovative solutions to critical environmental problems. The Executive Order sets aggressive targets for state facilities in greenhouse gas emission reductions, energy conservation and efficiency, renewable energy, green buildings, and water conservation. Massport participates in this program voluntarily.
- In 2009, Massport began developing an Energy Master Plan to reduce energy use and associated greenhouse gas emissions and increase the use of renewable energy for all Massport facilities. Further details on the Energy Master Plan are provided in *Chapter 7, Air Quality/Emissions Reduction.*

Table 8-4 Progress Report for Environmental Compliance and Management

Plan Elements	Progress Report for 2009
Environmental Compliance Inspections	In 2009, Massport performed tenant inspections of all of the 27 National Pollutant Discharge Elimination System (NPDES) co-permittees (Logan Airport tenants) and made recommendations suggesting how to rectify issues identified during the inspections. Massport conducted quarterly inspections of its facilities, NPDES co-permitted leaseholds, and car rental facilities. Corrective action in response to the Notice of Noncompliance (NON), including inspecting, cleaning, and equipping 80 catch basins with filter inserts within the Maverick Outfall drainage area, was completed by Massport and its tenants.
Environmental Management System (EMS) and International Organization for Standardization (ISO) 14001	ISO 14001certification was obtained for Facilities II (vehicle maintenance, landscaping, and snow removal) in December 2006 and recertified in December 2009. ISO 14001 certification for Facilities I (Central Heating and Cooling Plant) and Facilities III (Electrical and Structural) is scheduled for 2010.
Tenant Technical Assistance	Massport continued publication of *EnviroNews*, a quarterly newsletter that informs tenants of regulatory calendar milestones, permitting requirements, pollution prevention, and best management practices (BMPs). It recommends use of sustainable materials and provides information on Massport and other environmental requirements (2009 newsletters provided in *Appendix J, Water Quality/Environmental Compliance and Management)*.
Stormwater Pollution Prevention Plan (SWPPP)	In accordance with the requirements of the current stormwater outfall NPDES permit for Logan Airport that was issued on July 31, 2007, Massport and all 27 co-permittees and tenants were required to develop SWPPPs. Massport completed their SWPPP in December of 2007. Tenant SWPPPs were completed in March 2008. Massport's SWPPP addresses stormwater pollutants in general, and also addresses deicing and anti-icing chemical, potential bacteria, fuel and oil, and other sources of stormwater pollutants. BMPs are included in the SWPPP. In accordance the other requirements of the NPDES permit, Massport is required to conduct training for personnel responsible for implementing activities identified in the SWPPP. The 2009 Annual Certificates of Compliance were submitted to EPA and MassDEP in December 2009 for Massport and each co-permittee.
Construction	In 2009, Massport developed Sustainable Design Standards and Guidelines (SDSG) for use by architects, engineers, and planners working on capital improvement projects for Massport. The SDSG are designed to foster innovation yet include clear targets to achieve more sustainable building design and practices. *Chapter 1, Introduction* contains additional information on the SDSG. Massport requires construction BMPs to be included in contracts. Massport provides a generic SWPPP to contractors for all Logan Airport construction projects, which provides guidance in preparing project-specific SWPPPs and BMPs to control sedimentation and other pollutants from construction projects. Massport monitors construction projects at Logan Airport for compliance with project SWPPPs and regulatory requirements. For all construction projects, Massport requires the use of ultra low-sulfur diesel fuel in construction equipment, recycling of all construction waste to the maximum extent possible, and construction equipment retrofits with pollution control devices such as diesel oxidation catalysts and/or particulate filters.
Spill Prevention Countermeasure and Control (SPCC) Plans	Tenants meeting certain thresholds are required to prepare their own SPCC plans for their facilities. Massport checks for SPCC plans during its environmental compliance inspections. Additionally, tenants receive information on Massport BMPs, which focus on spill management and prevention.
Air Emissions Reduction	All Massport diesel vehicles are now fueled with ultra low-sulfur diesel. In 2007, Massport installed parking heaters which operated independently of the vehicles' engine in two vehicles on a trial basis. The goal of the trial was to measure fuel savings/air emissions reductions of reduced vehicle idling during snow operations. After finding that the parking heaters resulted in draining vehicle batteries, Massport discontinued the trial in 2008. Massport will continue to explore anti-idling technologies as part of the EMS.

9

Project Mitigation Tracking

Introduction

This *2009 Environmental Data Report* (*2009 EDR*) provides a status report on the Massachusetts Port Authority's (Massport) mitigation commitments under the Massachusetts Environmental Policy Act (MEPA) for various Logan Airport projects. Each of the projects completed the state and federal environmental review processes and adopted a mitigation plan (Section 61 Findings).[1] Massport has a tracking program in place, the goal of which is to monitor Massport's and Logan Airport tenants' progress toward implementing and achieving their environmental mitigation commitments on schedule and according to the requirements set out in the Section 61 Findings for each project. As each project moves forward through its construction phases, its mitigation plan is implemented with an ongoing tracking system to ensure compliance. This chapter provides Section 61 mitigation commitment updates in 2009 for projects for which mitigation is nearing completion or is ongoing (Tables 9-1 through 9-7). Projects for which mitigation has been completed will not be reported on in future EDRs and ESPRs.

Projects Nearing Completion of Mitigation Requirements

- Runway End Safety Area (RSA) Improvements Project, Executive Office of Environmental Affairs (EOEA now Executive Office of Energy and Environmental Affairs (EEA)) #5122. (Project constructed except for the Runway 33L RSA enhancement; the Runway 33L RSA enhancement is now part of a new project (EEA #14442) undergoing separate environmental review according to federal and state requirements.) Further enhancements are also planned for the Runway 22R RSA as part of EEA #14442.

Projects with Ongoing Mitigation

- West Garage Project, EOEA #9790 (Phase I complete. Phase II construction commenced in 2004 as an expansion to the Central Garage and was completed in early 2007.
- International Gateway Project, EOEA #9791 (Phase I was completed in 2004; Phase II was completed in 2007; the final phase is not expected to be completed until after 2010).
- Replacement Terminal A Project, EOEA #12096 (Terminal A opened March 16, 2005).

1 Massachusetts General Law, Chapter 30, Section 61 (M.G.L. c. 30, § 61).

- Logan Airside Improvements Planning Project, EOEA #10458 (Runway 14-32 opened on November 23, 2006. The centerfield taxiway improvements were completed and the taxiway became fully operational in 2009).

Recently Approved Project with Upcoming Mitigation Conditions/Requirements

- Southwest Service Area (SWSA) Redevelopment Program, EEA #14137; on May 28, 2010, the Secretary of EEA issued a Certificate that determined that the Final Environmental Impact Statement (EIR) adequately and properly complies with MEPA and its implementing regulations. Massport's Board voted and approved the Section 61 Findings for the SWSA Redevelopment Program on June 17, 2010. Construction of the program commenced in summer of 2010 and will be complete in 2015. The *2010 EDR* will report on progress in meeting the Section 61 requirements.

Projects Nearing Completion of Mitigation Requirements

Runway End Safety Improvements Project - EOEA #5122 (Runways 22L, 4L/4R, and 27)

Permitting History

- Certificate on the Final EIR issued on March 18, 1992
- Section 61 Findings submitted to EOEA August 10, 1992

Project Status

The RSA Improvement Project (Figure 9-1) consisted of the creation of safety area enhancements at certain runway ends to accommodate aircraft overruns and rescue access in emergency situations.

- Safety improvements for Runways 22L, 4L/4R, and 27 are complete.
- In 2005, Massport constructed an Engineered Materials Arresting System (EMAS) bed at the end of Runway 22R in compliance with Federal Aviation Administration (FAA) directives, though no MEPA review was needed. In 2006, as part of a separate project, Massport installed an EMAS bed at the Runway 33L end. Consideration of further enhancements to the runway safety areas at the ends of Runways 22R and 33L is now a separate project for which Massport is preparing a combined Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and an EIR in accordance with MEPA. An Environmental Notification Form (ENF) was filed with MEPA on June 30, 2009. The Draft EA/EIR submitted to FAA and EEA on July 15, 2010, examines alternatives for enhancing the runway safety at these locations to be consistent with current FAA design guidelines to the extent practicable. The Secretary of EEA is expected to issue a Certificate on the Draft EIR/EA on or about September 17, 2010. This project will have its own Section 61 mitigation commitments that will be reported in subsequent EDRs and Environmental Status and Planning Reports (ESPRs).

Table 9-1 summarizes the mitigation measures in the Section 61 Findings for the Runway End Safety Improvements Project for Runways 22L, 4L/4R, and 27 and Massport's progress in achieving these measures through the end of 2009.

Figure 9-1 Runway End Safety Improvements

Table 9-1 Runway End Safety Improvements Project Status Report (EOEA # 5122) Section 61 Mitigation Measures (as of December 31, 2009)

Mitigation Measure	Status
Logan Salt Marsh Replication Project	
Massport will create 25,650 square feet of replacement wetlands along Taxiway November ("N") in the City of Boston.	**Implemented.** The new 56,250 square-foot marsh is located next to Taxiway N. Vegetation established quickly with the help of "donor" stock that was taken from the original salt marsh; several species of fish, egrets, and snowy owls have been observed; and soft-shell clams and other shellfish have established throughout the new marsh.
Massport will assign a wetland specialist to monitor the salt marsh creation and report the findings.	**Implemented.** A wetlands specialist was assigned to the Project. The replication area has developed into a healthy marsh environment, which is indistinguishable from the native marsh.
Monitoring activity will continue during the first two growing seasons to assess the progress of Spartina alterniflora and Spartina patens growth.	**Implemented.** Permits were obtained that required Massport to monitor the health of vegetation, plant, fish, and wildlife for five years. The five-year monitoring program was completed in 1998 and the final Salt Marsh Monitoring Report was filed in February 1999. The Logan Salt Marsh Replication Project is providing more than six times as much salt marsh as was lost to the Runway End Safety Improvements Project.
Lewis Lake Salt Marsh Restoration Monitoring Program	
Massport agreed to provide technical planning and assistance to the Town of Winthrop in the form of a study of the feasibility of restoring salt marsh vegetation at Lewis Lake.	**Implemented.** The Lewis Lake Hydrologic Study was submitted to EOEA and noticed in the Environmental Monitor on June 8, 1993. The study was also submitted to the Winthrop Conservation Commission.
Potential Construction Impacts and Mitigation	
Construction mitigation measures include awarding the project to a single primary contractor; conducting all construction within the silt curtains; conducting a water quality monitoring program; implementing noise control guidelines for airfield construction; coordinating with the FAA to minimize impacts on air traffic operations and runway assignments; construction traffic restrictions and routing.	**Implemented.** Completed for Runways 22L, 27, 4L/4R. Enhancements to the Runway 33L runway safety area (RSA) are part of a new project which also evaluates potential enhancements to the Runway 22R RSA.

Table 9-1 Runway End Safety Improvements Project Status Report Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Soft-Shell Clam Planting and Monitoring Program	
Soft-shell clam monitoring.[1]	**Implemented.** Massport completed the initial clam relocation and two subsequent annual planting programs. However, due to new FAA guidance regarding the proximity of wildlife attractants to runways Massport has not conducted any more planting programs. In June, 2007, Massport executed an Agreement with Massachusetts Division of Marine Fisheries (DMF) relative to the Shellfish Relocation Plan. Under the Agreement, Massport will fund a series of alternative mitigation measures to be implemented by DMF, which include, but are not limited to: (1) improvements to the DMF soft-shell clam depuration facility in Newburyport, MA; (2) conversion of the DMF lobster hatchery on Martha's Vineyard to a soft-shell clam seed production facility; (3) a Boston Harbor water quality monitoring program; or (4) an extension of the DMF Boston Harbor Soft Shell Clam stock enhancement program. Massport made an initial payment in June 2007 and the final payment in 2009, thus completing all outstanding permit requirements.
Monitoring Program of Runway Ends Transition Zones	
Monitor the stability of the transition zones at the end of Runways 22L and 27.	**Implemented.** Massport continues to conduct regular inspections to ensure that aggregate stone from the transition zones does not impact wetland and coastal areas, and to re-grade to repair damages as necessary. Several areas of geotextile mattresses which are used to stabilize the seaward perimeter of the aggregate stone have begun to exhibit signs of wear. Massport continues to evaluate strategies to repair or replace these mattresses.

Note: Text in italics detailing the mitigation measures is from the Section 61 Findings submitted to the EOEA, August 1992.
1 Mitigation measure was established when obtaining the Wetlands Protection Act variance from the MassDEP and not in the Section 61 Findings.

Projects with Ongoing Mitigation

West Garage Project - EOEA #9790

Permitting History

- Certificate on the Final EIR issued on March 16, 1995
- Section 61 Findings approved on March 27, 1995

Project Status

The West Garage Project (Figure 9-2) was initially proposed to be constructed in two phases. Phase I of the Project provided 3,150 parking spaces that were consolidated from other areas of Logan Airport. The West Garage is directly connected to the Central Garage, centralizing the two structures' parking into a larger, single functioning, easily accessible garage. The West Garage Project also included construction of elevated walkways connecting the West Garage to Terminals A and E, and improvements to the terminal roadways. The original design of Phase II of the West Garage included the construction of a new structured parking facility adjacent to the West Garage. Instead, Massport concluded it was more cost efficient to proceed with Phase II by adding

three additional levels (Levels 5, 6, and 7) to the existing Central Garage. Phase II of the West Garage Project provides approximately 2,800 additional parking spaces.

- Phase I – Construction commenced in October 1995 and the garage opened on September 8, 1998. The elevated walkways to the terminals were completed in 2002. Improvements to terminal roadways were completed in 2003.
- Phase II – Permitting completed in 2000 to add three levels to the Central Garage. Construction commenced in 2004 and the entire facility was completed in 2007.

Table 9-2 lists each Section 61 mitigation commitment for the West Garage Project and Massport's progress in achieving these measures. Table 9-3 details the elements and status of the Alternative Fuels Program, which was a key mitigation effort associated with the West Garage Project. The mitigation measures in Tables 9-2 and 9-3 are from Section IV Mitigation of the *West Garage Project Final EIR*, January 31, 1995, and those measures referenced in the Massport Board vote on the West Garage Project.

Figure 9-2 West Garage Project

Phase I West Garage Construction
Phase II Addition to Central Garage

Table 9-2 West Garage Project Status Report (EOEA #9790)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009)

Mitigation Measure	Status
Project Design Measures	
Vehicle Circulation and Operation	
Separate airport roadway into enplaning and deplaning levels.	**Implemented.** The dual level roadway was completed in 2003 with connections to new Terminal E. The remainder of the service roadway systems opened in August 2004. When Terminal A was rebuilt, it included separate enplaning and deplaning levels.
Improve access between the Airport Service Road and Route 1A.	**Implemented.** Construction began in 2000. In January 2003, the new westbound bridge from Route 1A was opened to bi-directional traffic. This occurred in conjunction with the opening of the Ted Williams Tunnel to all traffic. Work was completed in 2007.
Combine operations and vehicle connections between the West and Central Garages.	**Implemented.** Construction of shared entrance and exit plazas was completed in September 1998.
Pick-up / drop-off areas within the garage at circulation cores.	**Implemented.** Construction was completed in September 1998.
Improved vehicle flow within the Central Garage.	**Implemented.** Construction of new high-speed ramps was completed in September 1998.
Provide reliable information about the location and availability of on-Airport parking spaces to eliminate vehicle re-circulation.	**Implemented.** Massport provides information on peak period airport parking availability through its advertising and public information programs; and has implemented, in conjunction with "Smart Traveler", a tele-link between Massport's 1-800-23LOGAN and the "Smart Traveler" information system which provides up-to-date parking availability reports. Since August 1999, Web site users may log on to www.massport.com and receive timely parking and traffic information. Massport procured a replacement parking revenue control system that provides an enhanced space count system and directional signage for the West Garage, Central Parking, and the Terminal B Lot. The new revenue control system was fully operational in 2005.
Improve Terminal A curb to promote HOV (high occupancy vehicle) use.	**Implemented.** HOV curb access at Terminal A was included in Delta Air Lines' design for the Terminal A Replacement Project. The HOV curbs are closest to the terminal and provide ease of access to both the arrival and departure levels. There is no short-term parking at the terminal. The Central Parking Garage is connected to the new Terminal A by an elevated walkway system. Terminal A opened on March 16, 2005.
Pedestrian Circulation and Amenities	
Enhance pedestrian connections between Central and West Garages and terminals.	**Implemented.** Climate-controlled pedestrian bridges with moving and stationary sidewalks were constructed to connect the West Garage to Terminal A and E. These pedestrian amenities opened at the same time as Phase I of the West Garage in 1998. Terminals B and C pedestrian connections began construction in the summer of 1999 and were completed in 2002. An additional connection was added between the Hilton Hotel and the West Garage.
Provide airport-wide baggage cart access.	**Implemented.** Baggage carts and access for pedestrians became fully available in the completed West Garage via the elevated walkways to Terminals A and E. Baggage carts are available throughout the Airport, in the terminals and in the parking garages.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Building Design Features	
Incorporate shield rooftop lighting with directional shielding to minimize glare. Install shield heating, ventilation, and air conditioning (HVAC) equipment to minimize noise.	**Implemented.** Construction was completed in September 1998.
Massport will continue to meet with the Community Working Group (CWG) to review the building's design and to explore other design improvements that might address specific issues identified by the CWG such as the two aforementioned measures.	**Implemented.** Massport staff held community meetings/CWG workshops during the design of the West Garage Project (during 1995 and 1996).
Construction Period Mitigation	
Agency and Community Coordination	
Designation of personnel to provide rapid response to construction issues and problems. Designate a liaison person to respond to any community concerns.	**Implemented.** The Logan Modernization (formerly Logan 2000) Construction "Response-line" was created and placed in service in late February 1996. Since its implementation, no calls have been received. Construction-related issues are handled through the Office of Government and Community Affairs (OGCA) community response liaison. OGCA has designated liaisons to respond to community concerns.
Prepare newsletters and hold community meetings during the construction process.	**Implemented.** The West Garage Highlights newsletters were produced to coincide with all Draft EIR and Final EIR filings for Logan Modernizations projects. Massport announced all public comment periods in local papers. Community Forum meetings were noticed in community newspapers. Numerous community meetings were held for the general public and the CWG. In early 2001, a construction update feature was added to the Massport website. This section was updated periodically to inform interested parties about upcoming construction impacts associated with Phase II. The website allowed users to add their addresses to a subscriber list. The subscribers on the list were notified when there were significant updates to the construction section.
Continue to coordinate construction activities with other governmental agencies as appropriate.	**Implemented.** During construction, Massport staff held biweekly construction meetings with the contractor, CA/T, and Massport Operations. Massport had staff dedicated to daily interagency coordination, with the assistance of consultant personnel. Meetings were held with the CA/T staff on an as-needed basis with regard to the 7D2 and the 8A construction process. Establishment of the Massachusetts Bay Transportation Authority's (MBTA's) new Blue Line Airport Station was an element of the 8A construction. The MBTA opened the new station in June 2004. Massport and MBTA continue to collaborate on Blue Line and Silver Line Airport service.
Placement of personnel and equipment to monitor and report on the status of construction.	**Implemented.** Massport hired full-time construction management staff during Phase I who maintained daily reports and logs for all construction activities including any potential impacts or mitigation measures. Reports and logs were maintained for traffic, parking, noise, soil disposal, etc. Monitoring continued through Phase II.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Creation of specific construction-related performance standards for incorporation into construction contracts, such as: ▪ *Safety and security measures;* ▪ *Site appearance and housekeeping requirements; and* ▪ *Site logistics and traffic control measures.*	**Implemented.** The West Garage contract specifications included standards and requirements for safety and security, site appearance, and site logistics and traffic control. These standards and requirements were adhered to during construction of Phase I of the West Garage Project and the Phase II Central Garage expansion.
Ground Transportation Mitigation During Construction	
Construction vehicles will be required to use either state highways (Route 1A, Interstate 90, and the main airport roadway) or Logan Airport roadways for access to and from the construction site, unless accessing local businesses. Truck routes designed to minimize impacts to the regional highway network and neighborhoods will be specified in contractors' construction specifications.	**Implemented.** The West Garage Project's construction specifications required the use of designated truck routes. During construction of Phase I, truck routes were restricted to Airport service roads and roads accessed from either the Ted Williams Tunnel and/or Route 1A. East Boston streets were not utilized. These mitigation measures also were employed during the Phase II Central Garage expansion.
Concrete production and batching will occur in existing plants with access via Route 1A or Interstate 90 in order to reduce on-Airport construction activities and consolidate truck trips to greatest extent possible.	**Implemented.** On-site concrete production and batching were prohibited during Phase I of the West Garage Project. Contractors used concrete suppliers that accessed the site via Route 1A from the north. Concrete production and batching was conducted off-site and product delivery was consolidated in as few truck trips as possible. These mitigation measures also were followed as part of the Phase II Central Garage expansion.
Construction companies will be required to provide off-Airport parking for their employees. No construction employees will be allowed to park at the construction site or anywhere at the Airport, except for a small number of supervisory personnel.	**Implemented.** During Phase I of the West Garage Project, on-site parking was limited to 30 spaces for supervisory personnel and equipment only. Parking permits were issued to enforce these rules. The State Police towed vehicles parked without permits. These mitigation measures also were followed during the Phase II Central Garage expansion.
Construction workers were expected to access the site via public transportation or via shuttle buses from off-Airport parking areas. Massport will encourage construction workers to use Logan Express, Water Shuttle, MBTA, and other modes of public transportation.	**Implemented.** Massport provided construction contractors with information about public transportation alternatives for their workers and also allowed construction workers to purchase discounted monthly passes for Logan Express to encourage use of these services. Massport also encouraged construction contractors to join the Logan Employee Transportation Management Association (Logan TMA), which is open to all airport employers. During the construction period of Phase I of the West Garage Project, construction workers were encouraged to use public transportation and the aforementioned Massport services to access the job site. These mitigation measures also were employed during the Phase II Central Garage expansion.
Massport will explore the feasibility of consolidated off-Airport parking for construction workers.	**Implemented.** Massport reviewed the costs and feasibility of providing consolidated off-Airport parking. Because workers commuted to the Airport from many different locations, using many modes of transportation, this option did not appear cost-effective or practical until the number of contractor employees exceeded 500-600. During Phase I, Massport monitored the schedules, but the number of contractor employees (approximately 250) did not exceed the quantity needed to provide a consolidated off-site parking area.

**Table 9-2 West Garage Project Status Report (EOEA #9790)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009)
(Continued)**

Mitigation Measure	Status
Massport will encourage the provision of consolidated shuttle bus service and will encourage the use of alternative fuel vehicles (AFV).	**Implemented.** Massport reviewed the costs and feasibility of providing a consolidated off-Airport shuttle bus for contractor employees. During Phase I, Massport monitored the schedules to determine if employees exceeded 500 to 600, but the number of contractor employees (approximately 250) did not exceed the quantity required for Massport to provide an off-Airport shuttle bus service.
Massport will construct temporary roadways as necessary to maintain operation of all Airport roadway connections and minimize impacts to on-Airport traffic patterns.	**Implemented.** Contract plans and specifications required maintenance of the existing number of traffic lanes throughout construction of Phase I. Temporary lane closures were conducted during off-peak hours (midnight to 5:00 AM). Any other extended closures required the construction of a temporary detour. These mitigation measures also were employed during the Phase II Central Garage expansion.
Massport will develop specific construction staging plans, including acceleration and deceleration lanes for trucks and maintaining the existing number of travel lanes.	**Implemented.** During construction of Phase I of the West Garage Project, truck access was provided via a separate lane off the Airport U-turn to minimize disruption to inbound and outbound Airport traffic. The existing travel lanes were maintained at all times. These mitigation measures also were employed during the Phase II Central Garage expansion.
Construction Management	
Control noise by: ▪ *Pre-auguring pile locations and the use of pre-cast concrete piles in lieu of steel piles.* ▪ *Using noise control techniques to reduce noise from pile driving by at least 5 A-weighted decibels (dBA) below their unmitigated levels.* *Control noise by:* ▪ *Evaluating further noise control options during project design.* ▪ *Incorporating appropriate operational specifications and performance standards into the construction contract documents.* ▪ *Monitor community noise levels during construction to verify compliance with contract specifications and applicable state and local noise regulations.*	**Implemented.** All piles used in Phase I were pre-cast concrete with pre-auguring. No steel piles were used. Concrete piles were drilled for the largest portion of their depth to minimize noise impacts. No piles were driven after 4:00 PM. During construction, further noise evaluation was not required for the West Garage since noise levels did not exceed applicable regulations. All specifications and performance standards were incorporated into the construction contract. These noise mitigation measures also were employed during the Phase II Central Garage Expansion.
Hours of work generally will be limited to typical working hours of 7:00 AM to 5:00 PM unless constrained by operational conditions at the Airport.	**Implemented.** Work involving roadway lane closures was conducted after 5:00 PM or before 7:00 AM during Phase I. These mitigation measures also were employed during the Phase II Central Garage expansion.
Adequate storage areas for construction materials will be located away from residential areas.	**Implemented.** During construction of Phase I, all storage of materials occurred on the construction site very far from the residential areas. Due to limited available space, very little construction materials were stored on-Airport during Phase II. Following community coordination, a section of the North Service Area was used for temporary staging. These mitigation measures also were employed during the Phase II Central Garage Expansion.

**Table 9-2 West Garage Project Status Report (EOEA #9790)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009)
(Continued)**

Mitigation Measure	Status
Fugitive dust will be controlled through wetting, sweeping, and other dust suppression techniques. Massport will require contractors to maintain on-site water trucks. All trucks hauling materials and excavation from the site will be covered.	**Implemented.** During construction of Phase I, a water truck was maintained on-site at all times and road sweeping occurred as required to clean any debris dropped on- road or tracked by tires. These mitigation measures were employed during the Phase II Central Garage expansion.
Massport will mitigate construction-related air quality impacts through the on-Airport traffic flow maintenance procedures and the use of good housekeeping practices to minimize fugitive dust.	**Implemented.** During construction of Phase I, the contractor maintained on-site wheel washes, water trucks, and road sweepers to control fugitive dust. These mitigation measures also were employed during the Phase II Central Garage expansion.
Develop a Draft Soil Management Plan.	**Implemented.** The Soil Management Plan, a component of the Logan Modernization Environmental Plan, was enforced during construction. The soil excavation activities associated with the West Garage Foundation project were completed. No remediation waste was identified; all non-remediation waste excavated (total Petroleum Hydrocarbons were less than 500 mg/kg) was shipped off-site to approved off-site disposal facilities under a MassDEP Material Shipping Record. Massport conducted oversight of the contractor's compliance with the Soil Management Plan. No soil excavation was required as part of Phase II.
Develop a Draft Dewatering Management Plan which addresses requirements for testing, handling, and treatment of contaminated groundwater from de-watering prior to discharge.	**Implemented.** A final Dewatering Management Plan was incorporated into the Logan Modernization Environmental Plan. During the West Garage Foundation project, all de-watering was performed in compliance with Logan Modernization, Massachusetts Contingency Plan (MCP) requirements and Massport's National Pollutant Discharge Elimination System (NPDES) permit. Massport's oversight of the contractor's compliance with the De-watering Plan continued during the West Garage superstructure construction project. No construction dewatering was required as part of Phase II.
Develop a Draft Stormwater Pollution Prevention Plan which is intended to keep the Airport's storm water system free of sediment and contaminants during construction. The plan will be incorporated into construction plans, specifications, and contracts.	**Implemented.** A final Stormwater Pollution Prevention Plan (SWPPP) was incorporated into the Logan Modernization Environmental Plan. During the West Garage foundation project, the contractor complied with the requirements specified in the SWPPP. Massport's oversight of the contractor's compliance with the SWPPP continued during the West Garage superstructure construction project. No violations were reported. These mitigation measures also were employed during the Phase II Central Garage expansion.
Develop a Draft Health and Safety Plan which provides the minimum health and safety specifications that contractors must meet during construction, including requirements for environmental monitoring, personnel protective equipment, site control and security, and training.	**Implemented.** A final Health and Safety Plan (HASP) was incorporated into the Logan Modernization Environmental Plan. During the West Garage foundation project, the contractor performed its activities in compliance with the HASP. Massport's oversight of the contractor's compliance with the HASP continued during the West Garage superstructure construction project. The contractor submitted a specific safety and security plan for review and approval by the construction manager. The Terminal Area Coordinator maintained regular (at least weekly) site audits to verify compliance. These mitigation measures also were employed during the Phase II Central Garage expansion.
Rodent control inspection, monitoring, and treatment will be carried out before, during, and at the completion of all foundation and utilities demolition and construction work.	**Implemented.** Rodent control was not an issue during construction of Phase I or Phase II of the West Garage Project.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Massport has asked the contractor to review other construction mitigation measures including disposal of excavated materials, fences, and wheel washing.	**Implemented.** During construction of Phase I of the West Garage Project, Massport installed and maintained graphic panels on all construction fences to provide a more pleasing appearance to the construction site. Wheel washing was required at all times. Disposal of excavated materials was compliant with the Soil Management Plan. These mitigation measures also were employed during the Phase II Central Garage expansion.
Parking Pricing	
Parking pricing initiatives: keeping first-hour price high enough to provide a disincentive for pick-up/ drop-off.	**Implemented.** Massport continues to evaluate and adjust the first-hour price of parking. In light of the security prohibition on curbside parking, in 2002, Massport reduced the cost of the first half-hour from $4 to $2, the first time it has changed since the first-hour free rate was rescinded in 1998. In June 2007, rates increased to $3 for the first half-hour. These parking rates were temporarily increased to $4 for the first half-hour between February 1 to March 5, 2009. After public input, the Board voted to rescind these increases. The current rates are the same rates that were in effect prior to February 1, 2009.
Parking pricing initiatives: keeping the weekly price low enough to encourage vacation travelers to park for a week.	**Implemented.** Massport encourages long-term parking by providing lower cost parking at its Economy Lot. Data on long-term parking use are provided in *Chapter 5, Ground Transportation.*
Massport will consider means to encourage the use of limited amount of on-Airport commercial parking for long-term parking and promote environmentally positive modes of airport access by air passengers.	**Implemented.** An important element of Massport's strategy to reduce the impact of Airport-related traffic on regional highways and local streets in neighboring communities is the Massport Parking Pricing Policy. Historically, Massport's Parking Pricing Policy encouraged long-term parking over short-term parking. That was accomplished by charging a premium for time spent in the on-Airport parking facilities between one and four hours and substantially reducing the per hour rate for parking durations longer than four hours. This strategy has proved to be a successful incentive for passengers to drive themselves and park long-term at Logan Airport rather than having someone else drop them off or pick them up.
Once sufficient data has been collected, Massport will evaluate parking behavior that may be attributable to the modified rates and consider further adjustments in pricing that will assist in achieving Massport's ground transportation goals.	**Implemented.** Massport's current parking rate structure is compatible with continued growth in long-term parking and declines in pick-up/drop-off mode shares, and the continued goal to increase in the total HOV use by air passengers toward 35.2 percent HOV access mode share. Adjustments to hourly parking rates have been made over time to reflect usage patterns.
Executive Director shall report to Massport annually regarding the effectiveness of parking pricing policy in achieving Massport's ground access goals initiatives and recommend appropriate policy adjustments.	**Implemented.** In October 2001, the Massport Board granted approval of commercial parking rates consistent with Massport's ground access goals. The higher rates went into effect November 12, 2001. In addition, in light of the new security restrictions on curbside parking, Massport reduced the cost of parking for the first half-hour from $4 to $2. In June, 2007, the cost of parking for the first half-hour increased to $3. These modifications foster the use of alternate forms of transportation for getting to Logan Airport, whereas the weekly cap at Economy parking encourages long-term parking over pick-up and drop-off as a mode of access.

**Table 9-2 West Garage Project Status Report (EOEA #9790)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009)
(Continued)**

Mitigation Measure	Status
Concurrent Ground Access Improvement Mitigation Measures	
Employee Trip Reduction Measures	
Massport will form a Transportation Management Association (Logan TMA) for Logan Airport employees to provide new opportunities for the development of targeted transportation demand management (TDM) strategies for Massport and airport tenant employees.	**Implemented.** In the 1995 Board Resolution, Massport's Executive Director was authorized to expend an initial amount of up to $50,000 for the purpose of organizing the Logan TMA. The Logan TMA was created in March 1997. Massport continues to support the Logan TMA by providing the Logan TMA with $65,000 annually, as well as space and equipment for the Logan TMA store in Terminal C. In turn, the Logan TMA has a Logan TMA Coordinator who develops, coordinates, and implements effective TDM strategies including discounts on high occupancy vehicle (HOV) services.
Massport will provide support for the formation and operation of the Logan TMA.	In late 2006 , Logan TMA staff requested a meeting with all major employers at Logan Airport to explain existing Logan TMA programs, and to explore commuting issues that the Logan TMA might be able to help address. Logan TMA staff arranged a series of one-on-one meetings with those employers who responded positively; the Logan TMA staff then conducted the meetings. Based largely on the information gathered at those meetings a series of new commuting initiatives was launched by the Logan TMA in 2007 as reported in the *2007 EDR*. See *Chapter 5, Ground Transportation* of this EDR for the status of these initiatives in 2009.
Massport will seek to develop, coordinate, and implement effective TDM strategies to reduce the number of single-occupant trips made by all Logan Airport employees.	**Implemented.** Massport continues to work with the Massachusetts Department of Transportation (MassDOT) (which provides the Logan TMA coordinator position through its MassRIDES program) to restructure the Logan TMA membership. As part of the restructuring effort, the Logan TMA will be having conversations with each employer in order to develop future TDM services that best meet their needs. The 1995 Board Resolution authorized Massport to actively explore with the Logan TMA the feasibility of implementing various services. Massport assists the Logan TMA in providing services and by conducting the Logan Airport Employee Survey intermittently (a survey was conducted in 2007) to collect data useful to the Logan TMA. A new survey was conducted in 2010 to update the 2007 survey. Results of the 2010 survey will be included in the *2010 EDR*.
Massport will encourage participation by all employees, but will particularly target the airport's largest employers.	**Implemented.** Massport continues to target Logan Airport's largest employers. Refer to *Chapter 5, Ground Transportation*, for more details on the Logan TMA and its membership.
Massport will report on the formation and activities of the Logan TMA in the next Generic Environmental Impact Report (GEIR).	**Implemented.** The Environmental Status and Planning Reports (ESPRs) and EDRs provide detailed information on the Logan TMA, its services, membership, and employee commuter choices (via the Logan Airport Employee Survey). Logan TMA information is provided in *Chapter 5, Ground Transportation* of this *2009 EDR*.
Massport proposes to implement a new Logan Express service or other HOV service depending on the needs of the targeted market before Phase II of the West Garage Project is operational.	**Implemented.** Massport completed its market-based analysis for a North Shore Logan Express in March 2000. The Peabody Logan Express facility opened in September 2001 (See *Chapter 5, Ground Transportation* for additional information on Peabody Logan Express).

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Provide an airport shuttle service from South Station Transportation Center. Massport is preparing a feasibility and business plan for a South Station-Logan Airport shuttle service and will implement this service when the Third Harbor Tunnel is opened for commercial traffic. This service will be modeled on the existing, successful Logan Express services and will include frequent bus service between South Station and the airport terminals. *Massport will regularly evaluate the frequency of, and demand for, such shuttle service and will provide such service at the greatest frequency that is practical and effective.*	**Implemented.** In 1997, Massport sponsored the development of a joint public/private partnership with intercity bus operators serving the South Station Transportation Center. This partnership resulted in a bus connection that both the carriers and Massport promote. The service had limited success largely because of variable operator schedules and the fact that the service operates out of the South Station Transportation Center instead of a location closer to the South Station Red Line stop. To improve the service between South Station and Logan Airport, Massport initiated a service, Logan DART, in November 2000. Massport anticipated that this service would provide an interim connection between South Station and Logan Airport until the opening of the South Boston Piers Transitway. This service competed with other frequent commercial bus services between South Station and Logan Airport, including Concord Trailways, Dartmouth Coach, Plymouth & Brockton, Bonanza, Vermont Transit, and C&J Trailways. Together, these services provide more than 50 daily weekday departures from South Station from 4:45 AM to 11:45 PM. Due to the poor ridership on DART, the numerous options available from South Station, the financial impacts following September 11, 2001, and the scheduled opening of the Silver Line Extension/AITC, Massport suspended this service in November 2001. In the interim, Massport coordinated a database of existing South Station/Logan Airport services provided by scheduled carriers and has produced flyers to improve visibility of this service to the public. This service accommodated passenger demand between South Station and Logan Airport until Silver Line service to Logan Airport commenced in June 2005 (refer to *Chapter 5, Ground Transportation* for additional information on the Silver Line). The Silver Line service to Logan Airport now provides this direct link.
Massport will implement a new water shuttle service in Boston Harbor before the opening of Phase I of the West Garage Project. The water shuttle would run between Logan Airport and one, or possibly, more sites in the Harbor.	**Implemented.** Massport identified a number of possible destinations for a new water shuttle service, with the Quincy Shipyard and Long Wharf sites meeting the basic service parameters. Harbor Express was chosen as the water shuttle operator and began operation between the Airport and these two sites in November 1996. Massport continues to support the Rowes Wharf Water Taxi and City Water Taxi operations. Refer to *Chapter 5, Ground Transportation* for water shuttle ridership information.
The Executive Director shall make recommendations to Massport for budgetary appropriations to establish and implement the new ground access services on a schedule that permits Massport to implement the new ground access services within these time frames.	**Implemented.** The Executive Director recommends budgetary appropriations for ground access services on an annual basis.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Enhancement of Existing HOV Services	
Expand Logan Express hours of service.	**Implemented.** Service is offered from Braintree as early as 3:15 AM and as late as 11:00PM; from Framingham as early as 4:00 AM and as late as 11:00 PM; from Woburn as early as 3:30 AM and as late as 11:00 PM; and from Peabody as early as 4:15 AM and as late as 1:15 PM. Buses leave every hour or half hour. The Logan Express schedule is available at www.massport.com.
Provide a guaranteed ride home for Logan Express users.	**Implemented and subsequently modified.** From January 1995 until November 2001, Massport provided this service for air passengers and Logan TMA members. Due to financial constraints following September 11, 2001, this program was suspended for those passengers arriving after midnight with pre-purchased round-trip Logan Express tickets. Logan TMA members still benefit from this service.
Provide Logan Express price incentives.	**Implemented.** Massport continues to monitor price incentives and implements additional incentives to promote Logan Express ridership, particularly during vacation periods and other periods of peak airport activity.
Develop an additional Logan Express service.	**Implemented.** Massport opened a fourth Logan Express in Peabody, Massachusetts in September 2001, several years before the Section 61 Commitment date of the opening of Phase II of the West Garage Project. While the new service was initially planned to operate on a half-hour schedule like the Braintree, Framingham, and Woburn services, because of the dramatic air passenger reductions after September 11, 2001, (during Peabody's first week of service), to cut costs, Massport operated the Peabody Logan Express on hourly headways. In January 2004, in light of low levels of ridership on the Peabody Logan Express, Massport doubled service by going to a half-hourly schedule in an effort to stimulate ridership growth at Peabody. However, in 2004, annual ridership levels at Peabody continued to be low, approaching 77,000 as compared to 527,000 at Braintree, 379,000 at Framingham, and 283,000 at Woburn. Annual ridership levels at Peabody, Braintree, Framingham, and Woburn were approximately 60,000, 466,000, 324,000, and 235,000 in 2009, respectively.
In conjunction with the MBTA, Massport will pursue joint ticketing opportunities for the Hingham Commuter Boat and the Logan Airport Water Shuttle.	**Implemented.** As reported in the *1999 ESPR* and the *2000 EDR*, this ticketing program was explored, implemented in mid-1995 and discontinued in 2000 since many of the former users of this program now use the Harbor Express Service direct from Quincy to Logan Airport.
Massport is reviewing the fee schedules and operating requirements of the dock in order to make it more accessible and convenient to potential water taxi operators.	**Implemented.** In the fall of 1995, Massport made physical improvements to a low-freeboard float at the Logan Dock to create a dock capable of accommodating smaller vessels such as water taxis. In the fall of 2002, Massport completed expansion of the Harborside dock to accommodate the demand of additional vessels and to comply with handicapped accessibility requirements. The improved dock increases capacity from a two float system to a seven float system to accommodate the various water shuttles, taxis, and charter boats that are licensed to use it.
Initiate a new Boston Harbor Water shuttle service.	**Implemented.** Harbor Express service, between Logan Airport and the South Shore, began in November 1996, well before the opening of Phase I of the West Garage in September 1998. In 2001, the MBTA took over operations of this service.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Expand docking capacity at Logan Airport for water taxi and other services.	**Implemented.** Massport accommodated water taxi services, enhanced the dock as described above, provided communication links for passengers to call the taxi, and allowed taxi passengers to use the free water shuttle buses to access the terminals from the dock. Water taxi information was posted on the Massport website. Details on the Water Taxi are provided in *Chapter 5, Ground Transportation.*
Other Measures	
Coordinate with public and private entities to provide more extensive radio, television, and telephone announcements of poor traffic conditions with suggestions for alternative access modes.	**Implemented.** The 1-800-23LOGAN Customer Information Line includes the number of the telephone text information line. Callers to Customer Information Line may access the latest traffic information, flight status, parking information, cell phone waiting lot information, or learn about alternative forms of transportation to and from Logan Airport. Starting in August 1999, real-time traffic information and parking became accessible on Massport's website. Massport regularly contacts the media to inform the public about roadway changes, parking shortages and to encourage travelers to use HOV services. Similar information is disseminated on the Logan Airport e-mail subscriber list, the Massport website, Facebook website, and on Twitter at twitter.com/bostonlogan.
HOV Marketing and advertising. Massport will continue the advertising and marketing programs for HOV services with an emphasis on promoting MBTA, Logan Express and water shuttle services to and from the airport.	**Implemented.** Massport spent approximately $5,000 on marketing of Logan Express in 2009. Massport continues to promote HOV services including availability, schedules and fares to consumers through the ground transportation Information Line at 1-800-23LOGAN and the website that provides up to the minute information. HOV advertising boards, schedules, and maps are placed at all Logan Airport terminals, at the MBTA Airport Station and at all shuttle bus pick-up/drop-off locations. Massport has actively promoted passenger water transportation in Boston Harbor for more than 20 years, playing a leadership role in policy development, planning, and promotions. This has included promoting vessel services at Logan in the following ways: ▪ Annual updates and in-terminal and citywide distribution of a brochure promoting water transportation at Logan Airport; ▪ Annual updates of harbor-wide water transportation map showing routes serving Logan Airport and other routes and landings as well – Massport provides this map to the MBTA, area non-profits, and others interested in promoting passenger water transportation in Boston Harbor; ▪ Updated information promoting passenger water transportation at Logan Airport on 1-800-23-Logan and www.massport.com; ▪ Planning and promotions for kick-off press conference launching the first-ever electric water taxi to operate in Boston Harbor (Green Water Taxi operated by Rowes Wharf Water Transport); and ▪ Collecting, tracking, and disseminating passenger water transportation ridership data for Logan Airport passengers to aid in planning and facility development. Elsewhere in Boston Harbor, Massport prepared final design materials for a new hub water transportation terminal in the South Boston Waterfront which, when built, would serve as a state-of-the-art landing for water taxis and a potential terminus for future Logan Airport-based scheduled vessel routes.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Prepare an inventory of private scheduled services including origins/destinations, schedule, and cost.	**Implemented.** Massport continues to update and track information and services by more than 700 privately operated passenger services certified to operate at Logan Airport. Industry changes with such operations make publication of reliable service and schedule information impractical, if not impossible. However, Massport continued to expand and update information on transportation options to Logan Airport using the latest information technologies, including: ▪ Information and links to transportation companies on the Massport website. Some sites accessed through internet links provided passengers with on-line reservation services; ▪ Most scheduled service operators provided placards with current schedules posted in bus stop shelters located on the curb at each terminal. Individual bus schedules were also available at the information booths; and ▪ Transportation information database for on-line assistance at Logan Airport terminal information booths.
Proceed with environmental review and seek funding for construction of People Mover system.	**Implemented.** Massport completed the EA and Major Investment Study for the Logan Airport Inter-modal Transit Connector (AITC). The AITC evolved out of the People Mover EIR/MIS process and evaluated new access routes to both the Blue Line and the South Station Transportation Center. On February 25, 1997, Massport submitted to the United States (U.S.) House Committee on Transportation and Infrastructure an application for the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) funds for the next phase of environmental review, planning and design of the AITC. Congressman J. Joseph Moakley was the congressional sponsor; the project also has the support from the Secretary of Transportation and the U.S. Environmental Protection Agency (EPA). The Logan AITC was included, for an unspecified funding level, in the 1997 ISTEA reauthorization bill. In 1998, Massport received a certificate on a Notice of Project Change for the People Mover from the Secretary of EOEA and a Finding of No Significant Impact (FONSI) on an EA from the Federal Transit Authority. In June 2001, Massport and the MBTA executed an interagency agreement for the purchase of eight Silver Line dual mode buses and the Massport Board approved the expenditure of approximately $13 million for this purchase. In 2004, Massport and the MBTA finalized the 10-year/$20 million dollar Inter-Agency Operating & Maintenance Agreement. The MBTA and Massport also tested the prototype bus on the Airport roadway system, checking vertical clearances, turning radii, and pick up/ drop off locations. Initial Silver Line service to the Airport began in December 2004 and full service began in June 2005 (refer to *Chapter 5, Ground Transportation* for additional details). In 2005, Massport and MBTA initiated planning to provide automated fare collection/Charlie Card equipment in each of the Logan Airport terminals. Charlie Card ticketing opened at Logan Airport in November 2006.
Alternative Fuels program. Massport is carrying out an extensive program to convert existing Massport-owned service vehicles to environmentally preferable sources. Table IV-2 summarizes the elements of the alternative fuels program and the schedule for their implementation.	**Implemented.** Table 9-3 of this *2009 EDR* details Massport's progress in achieving these measures.

Table 9-2 West Garage Project Status Report (EOEA #9790) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Measuring, Monitoring, and Evaluating Ground Access Improvements	
Massport will assess progress towards the achievement of HOV goals using on-Airport Automated Traffic Monitoring Systems (ATMS).	**Implemented.** ATMS is composed of three technologies that detect vehicle movement: inductive loop lines acoustic sensors, and canoga cards. Upgrades of the ATMS equipment, program software and infrastructure are underway and will result in accurate, meaningful vehicle counts. With the completion of the Terminal Area Roadway system and other regional highways expected in the near future, Massport prepared a long-range ATMS plan that will provide daily traffic counts at all gateways and other critical locations. Massport will be using new technologies in order to utilize on-Airport traffic signal controllers and loops for traffic counting. This project was bid and a contractor selected in 2008. In 2009, the project was under construction and the upgraded ATMS was functioning as planned and designed.
Massport will assess progress towards the achievement of HOV goals by monitoring parked vehicles using systems such as the parking and revenue control (PARC) system.	**Implemented.** Massport monitors all parking activity at Logan Airport and inventories all commercial parking facilities on a daily basis. Updated PARC systems were installed in the Terminal B Garage in 2004, with Central/West Garage following in 2005. Terminal E and Economy Lot 2 also have PARC systems.
Monitor HOV Services (Logan Express, MBTA, water shuttle, limousine/bus, and taxi).	**Implemented.** Massport maintains a "real time" log of dispatcher reports for Logan Express, the taxi pool, and the bus/limousine pool and other ground transportation operations at Logan Airport. Massport coordinates with the MBTA and the operators of all water shuttles serving Logan Airport to track ridership and service schedules. Daily Logan Express ridership and operations data are submitted monthly to Massport. Massport maintains a Passenger Water Transportation Ridership Summary on a monthly basis. Massport maintains a continuing record, the Ground Transportation Unit (GTU) Daily Event Log, of all occurrences impacting the Airport roadways, terminal curbs, and access roads. This log cites such events as accidents, lane closures, bus delays, as well as routine and non-transportation events.
Monitor passenger activity and employee modes of transportation.	**Implemented.** The most recent employee and air passenger surveys were conducted in the spring of 2010, but the data analysis was not available for this *2009 EDR*. The *2007 EDR* summarized the previous 2007 survey results in *Chapter 5, Ground Transportation*. Air passenger surveys are used to measure Massport's success in achieving a 35.2 percent HOV modeshare by the time Logan Airport accommodates 37.5 million passengers. The *2010 EDR* will provide a full report on the 2010 air passenger survey and its findings.
Massport supports the use of Automated Vehicle Identification (AVI) to monitor, manage, and facilitate efficient traffic operations at Logan Airport and elsewhere on the regional transportation system.	**Implemented.** An AVI system for Massport's Logan Airport shuttles and Logan Express buses is planned. All new buses are being procured with AVI/GPS, in anticipation of an (unfunded) "next bus" arrival notification system. In addition, the ConRAC facility will have an operations room with the required equipment to track the bus fleet.
Track the effectiveness of ground access measures.	**Implemented.** Massport continues to track the effectiveness of its ground access mitigation programs in its annual MEPA filings. See *Chapter 5, Ground Transportation* for 2009 details.

Note: Text in italics detailing the mitigation measures is from Section IV, Mitigation of the *West Garage Final EIR*, January 31, 1995.

Table 9-3 describes the Alternative Fuels Program, which was part of the West Garage Section 61 commitments.

Table 9-3 Alternative Fuels Program — Details of Ongoing Section 61 Mitigation Measures for the West Garage Project (as of December 31, 2009)

Program Element	Projected Date of Completion/ Acquisition	Status
Purchase four electric passenger utility vehicles	Winter 1995	**Implemented.**
Purchase five electric sedans	Winter and Summer 1995	**Implemented.**
Build compressed natural gas (CNG) quick-fill station	Spring 1995	**Implemented.** The station has been operational since 1995. It is New England's largest CNG quick fill station and serves Massport's vehicles, over two dozen Airport tenants, and nearby fleet vehicles. New higher flow dispensers at the station have reduced fueling time for heavy-duty vehicles, and have increased storage capacity at the station. Currently, more than a dozen companies and organizations are fueling natural gas powered vehicles at the station. In 2009, the station pumped approximately 27,300 gallon equivalents per month. Additional above-ground storage was also provided.
Purchase five electric buses	Spring and Summer 1995	**Implemented.** Massport purchased two electric buses and leased one. These vehicles operated at Logan Airport between 1996 and 2001. After more than six years of testing and evaluation, Massport determined that electric buses are neither durable nor dependable enough to function effectively in the demanding operating environment at Logan Airport. Massport's new unified bus fleet will include clean diesel/electric hybrid buses. Massport will continue to evaluate electric and other AFV as new technologies become available.
Purchase five electric pick-up trucks	Spring 1995	**Implemented.**
Use soy-blend diesel fuel	Spring 1995	**Implemented.** Massport's shuttle fleet operated on soy diesel from 1995 to 1999. In 1999, all the buses were replaced with CNG buses, which are still in service.
Purchase additional AFVs	Spring 1995	**Implemented.** Refer to *Chapter 7, Air Quality/ Emission Reduction* for a list of AFVs.
Purchase six CNG buses	Summer 1995	**Implemented.** There are 26 CNG shuttle buses in the current fleet.
Purchase four electric vans	Summer 1995	**Implemented.**
Install quick-charge kiosks for electric vehicles	Summer 1995	**Implemented.**
Develop slow-charge infrastructure	Ongoing	**Implemented.** The electric charging infrastructure included 15 inductive charging locations but these are not in use since there are no vehicles currently using inductive charging. Massport plans to support the current and future standard systems for plug-in electric vehicles.

International Gateway Project (Terminal E) - EOEA #9791

Permitting History:

- Certificate on the Final EIR issued on December 2, 1996
- Section 61 Findings submitted to EOEA June 26, 1997

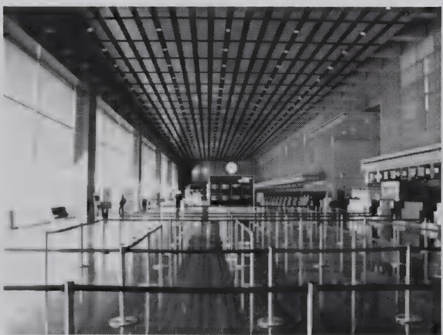
Project Status

The International Gateway Project (Figure 9-3) expands and upgrades Terminal E to provide better service to international passengers. The original Terminal E was opened in 1974 and over time became outdated and too small to accommodate the growth in international travel. This project is being constructed in phases:

- **Phase 1 –** This phase of the project included a weather-protected outside airside bus portico with an elevator and escalator linking the ground floor with the second floor to accommodate passengers arriving on remotely parked aircraft that are unable to park at a gate because it is occupied by another aircraft.
- **Phase 2 –** This phase of the project enlarged Logan Airport's congested Federal Inspection Services (FIS) Facility, and improved the meeter/greeter lobby and the ticketing area of Terminal E to maximize passenger convenience and reduce processing times in the terminal. The project called for the reconstruction and expansion of Terminal E in and around the existing terminal while keeping it operational and safe. The new departure hall includes high ceilings, wood paneling, built-in artwork, and views of the city skyline. Additionally, to reduce curb and roadway congestion at Terminal E, this project also included a new separated roadway system for arrivals and departures.
- **Future Phase –** This phase involves the construction of a new West Concourse, which will add three new gates to Terminal E to accommodate wide-body aircraft.

Construction of this project commenced in the summer of 1998. Phase 1 was completed in 2004. The departure level of the new $321 million terminal, including the new ticketing hall and departure level roadway, opened in May 2003. Enlargement of the FIS Facility and construction of the new arrivals level was completed in July 2007. Phase 2 is now complete. Preliminary work was completed for the Future Phase. However, further work on the Future Phase is not expected until after 2010. Additional information on the status of this project is available in *Chapter 3, Airport Planning.*

Table 9-4 lists each mitigation measure for the International Gateway Project in the Section 61 Findings along with Massport's progress in achieving these measures through the end of 2009.



Interior of Terminal E lobby, and Terminal E pedestrian bridge connection to Central Parking

Figure 9-3 International Gateway Project

Note: Runway 14-32 construction completed in November, 2006.

Table 9-4 International Gateway Project Status Report (EOEA #9791) Section 61 Mitigation Measures (as of December 31, 2008)

Mitigation Measure	Status
4.1 Project Design Measures	
Green Technology	
A variety of energy conserving and nonpolluting building materials, systems and equipment will be incorporated into the Project. These include the use of water-saving and flow-reducing devices, high-efficiency motors in the HVAC systems, energy-saving lighting, clearstories to maximize natural lighting, super-insulated walks and ceilings, and low E glass windows to further reduce heat load.	**Implemented.** The energy efficient requirements were included in the project design specifications and contract plans. Future phases will include green technology in their design specifications.
Public Art Projects	
An arts and culture program is being developed which will include themes of Boston as part of the international community, as an important cultural center, and as a gateway to New England and the United States.	**Implemented.** Includes public art in the ticketing hall and elevated pedestrian walkways.

Table 9-4 International Gateway Project Status Report (EOEA #9791)
Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Sculptures depicting New England culture will be installed in the facility.	**Implemented.** Artist-designed terrazzo floors have been installed in the elevated pedestrian walkways to the Central Garage. The walkways to Terminal E were complete in 1998.
400-Hz Power and Pre-conditioned Air	
With the Project, gate power for the aircraft will be provided directly from a central facility, with aircraft preconditioned air provided from "point-of-use" systems at the gate.	**Implemented.** Replacement or reconstruction of the terminal jet bridges has been completed. 400-Hz power and pre- conditioned air systems have been installed at the gates.
Alternative Fuel Outreach Program	
Massport is working cooperatively with the EPA and regional utility providers in coordinating an ongoing outreach program aimed at promoting the use of clean-burning alternative fuels. This program, which is also supported by fuel providers, vendors, and state and federal agencies, will offer information to airport tenants in the following areas: ▪ *Notification of grant programs or other financial incentives for vehicle conversions.* ▪ *Assistance in cost-benefit analysis for conversion of conventionally fueled vehicles to AFVs.* ▪ *Assistance in placing airport tenants in contact with alternative fuel suppliers and product vendors.*	**Implemented.** Massport continues to work cooperatively with National Grid, AVSG, the City of Boston, and the Massachusetts Clean Cities Coalition to promote the implementation and integration of Alternative Fuel Vehicles (AFVs) into local private and public fleets. In May 2007, Massport adopted two new policies to promote alternative fuel and hybrid vehicle usage at Logan Airport by others: 1) limited front-of-line taxi pool privileges; and 2) preferred Parking locations in the Central Garage and satellite locations. These policies were in effect through 2009. In addition, Massport has supported and sponsored the Boston GreenFest since 2009 and AltWheels Fleet Day since 2003. These are annual forums to promote alternative fuels and sustainable transportation modes. Massport has been a financial sponsor of these two events.
Bi-level Terminal Roadway and Curbside	
The Project will have a bi-level terminal roadway system.	**Implemented.** The viaducts connecting Terminal E to the new elevated enplaning roadway and the remainder of the enplaning and deplaning viaducts and roadway systems were completed and opened in May 2003.
Terminal curbs will be designed to promote and enhance the use of HOVs. Curbside areas earmarked for HOV use will be covered by a canopy and waiting structures on the curbside will provide additional protection from the weather.	**Implemented.** Construction of the terminal curbs and canopies was completed in December 2003.
Massport will periodically review its current policy, which assigns HOVs to the curb closest to the terminal.	**Implemented.** HOV access has been incorporated into the final design. Massport assigns HOV buses to the far end of the inner curb, near the exit from the terminal. As a result of analyses for Terminal E and the associated curb layout and traffic flows (conducted in 2002), smaller shuttle buses are now directed to the outer curb.
HOV Promotion	
Massport will reserve terminal space for ground transportation ticket sales, reservations, and information.	**Implemented.** This space has been provided in a staffed information area in the arrivals area of the new terminal. In a joint venture with MBTA new Charlie Card automated fare collection equipment was installed in all Logan Airport terminals in 2006.

Table 9-4 International Gateway Project Status Report (EOEA #9791) Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Attractive and distinctive signage and graphics will be utilized inside the terminal and out at the curb to clearly mark access to Logan Express, MBTA, water transportation, and other HOV options.	**Implemented.** Signage has been installed in the terminal and at the curbside identifying HOV curb locations.
As HOV services continue to develop and expand at Terminal E, Massport will expand its web page to encompass these new services and initiatives.	**Implemented.** Massport continues to reflect service changes on its website.
Massport and the MBTA will offer, on a trial basis, the sale of MBTA tokens via a vending machine in the baggage claim area of Terminal C.	**Implemented.** The Logan TMA sells MBTA passes. The MBTA Charlie Card machines (which replaced tokens) are located at the MBTA's new Blue Line Airport Station and Massport continues to offer free service to the station with its CNG bus fleet. As part of an Interagency Agreement with MBTA for operations and maintenance of MBTA Silver Line service to Logan Airport, the two transportation agencies installed the MBTA's automated fare collection (AFC) Charlie Card equipment in all Logan Airport terminals in 2006.
Connections to the West Garage	
The Project will be designed to allow pedestrian access to the new West Garage via an overhead walkway with moving sidewalks.	**Implemented.** Walkways to Terminals A and E and opened concurrent with the opening of the West Garage in September 1998.
Connections to Future Airport Intermodal Transit Connector (AITC)	
The Project is being designed with the flexibility to accommodate access to a possible future AITC station planned adjacent to the terminal.	**Implemented.** The project design includes this flexibility. The Airport Silver Line Service includes a stop at Terminal E.
4.2 Construction Period Mitigation	
Traffic Operations Mitigation	
Specific traffic mitigation measures to be employed will include, but not necessarily be limited to, the following: Maintaining full use of the roadways; requiring ingress and egress; requiring acceleration and deceleration lanes; prohibiting on-Airport contractor employee parking; encouraging the use of alternative modes of travel; and requiring police details.	**Implemented.** Measures to control traffic operations and mitigation of construction equipment were in contract specifications and will continue to be enforced during construction of future phases.
Noise Mitigation	
Noise control techniques will be used to reduce noise from pile driving by at least 5 dBA below unmitigated levels. These techniques include such measures as: Measures to minimize noise attributable to pile driving; use of concrete crushers; use of local grid power; mufflers, shields or shrouds on construction vehicles; noise-deadening material; equipment maintenance; limiting idling, public address systems; limiting air or gasoline driven hand tools; optimal site configuration; and efficient scheduling of truck loading, unloading and hauling operations to minimize noise.	**Implemented.** Restrictions on construction-related noise were included in the contract specifications, and will continue to be enforced during construction of future phases.

Table 9-4 International Gateway Project Status Report (EOEA #9791) Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Air Quality Mitigation	
Included measures such as performing regular street sweeping; suppressing water spray dust; fencing the perimeters of demolition and construction areas; and covering the trucks.	**Implemented.** Measures to reduce air quality impacts during construction were included in the contract specifications and will continue to be enforced during construction of future phases.
Overall Project Construction Mitigation	
Massport has hired a construction management (CM) firm which is responsible for overseeing all activities related to the Project. The CM will be responsible for ensuring that the following practices are carried out and adhered to: *Full agency coordination; preparation of detailed preconstruction plans; generally limited hours of work; list of construction do's and don'ts; transportation management plan; fugitive dust control; preconstruction environmental characterization of soils and groundwater; soils management plan; site-specific Stormwater Pollution Prevention Plan; Health and Safety Plan; encouraging the use of recycled building materials.*	**Implemented.** These measures were implemented throughout construction.
Rodent Control	
During the construction process, regular service visits will be made in order to maintain effective rodent control.	**Implemented.** Measures to control the rodent population were included in contract specifications and are implemented as needed.
Agency and Community Coordination	
On-site personnel and equipment; maintaining and monitoring the Logan 2000 community response telephone line; participation in an interagency planning/ construction coordination task force; specific construction related performance standards; continuing to meet with the community to provide a forum for addressing community concerns that arise during construction; publication of periodic newsletters advising the public as to the status of the project.	**Implemented.** Massport regularly meets with interested community groups and provides updates as requested.

Note: Text in italics detailing the mitigation measures is excerpted from the Section 61 Findings submitted to the EOEA, June 26, 1997.

Replacement Terminal A Project - EOEA #12096

Permitting History

- Certificate on the Final EIR issued on November 16, 2000
- Section 61 Findings submitted to EOEA August 31, 2001

Project Status

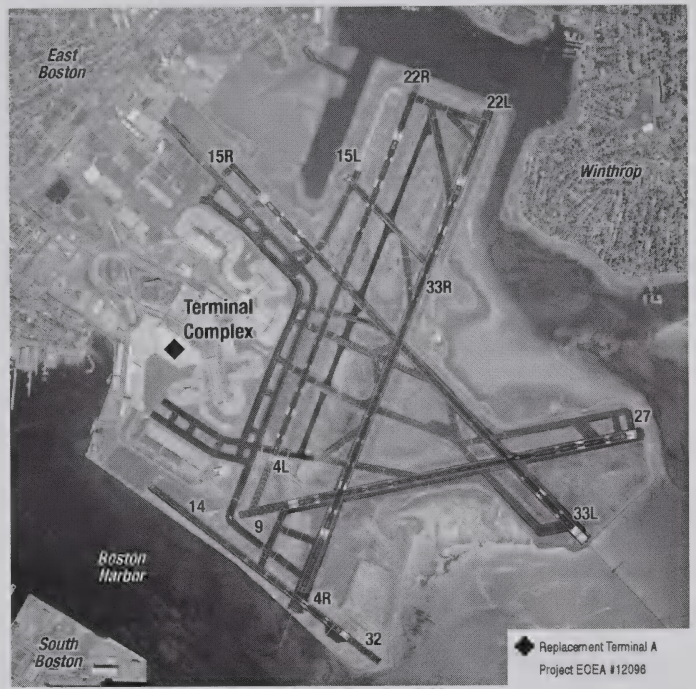
The Replacement Terminal A Project (Figure 9-4) involved the complete demolition of the pre-existing Terminal A and construction of a new facility by Delta Air Lines, consisting of a main terminal linked to a satellite concourse. The old Terminal A was closed in May 2002 and demolition commenced shortly thereafter. The project was designed to be constructed in five phases. However, as a result of September 11, 2001, air traffic at Logan Airport reduced dramatically allowing Massport to relocate the airlines at Terminal A to other terminals with minimal impact, and to shut down Terminal A entirely rather than having to phase construction concurrent with passenger activity. As a result, construction progressed ahead of schedule in 2003 and 2004. Terminal A opened on March 16, 2005.

In the spring of 2006, Delta Air Lines and Massport submitted an application for certification of Terminal A under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™. LEED certification was awarded in June 2006, making Terminal A the first airport terminal in the world to be awarded LEED certification.

The following sustainable elements were incorporated into the design of Terminal A:

- Water conservation – low-flow toilets, waterless urinals, and drip rather than spray irrigation.
- Atmosphere protection – zero use of chlorofluorocarbon (CFC)-based, hydrochlorofluorocarbon (HCFC) based, or halon refrigerants.
- Energy conservation – special roofing and paving materials that reflect solar radiation.
- Materials and resources conservation – more than 10 percent of all the building materials used to construct the terminal were from recycled materials.
- Enhanced indoor environmental air quality – low and volatile organic compound (VOC) free adhesives, sealants, paints, and carpets were used, and smoking is prohibited inside the terminal building.
- Sustainable sites – bicycle racks were installed in proximity to bus and subway systems.

Figure 9-4 Replacement Terminal A Project



Note: Runway 14-32 construction completed in November, 2006.

Table 9-5 lists each mitigation measure in the Section 61 Findings along with Massport's progress in achieving these measures through the end of 2009.

Interior of Terminal A lobby and large-scale art installation in the lobby.

Table 9-5 Replacement Terminal A Project Status Report (EOEA #12096) Section 61 Mitigation Measures (as of December 31, 2009)

Mitigation Measure	Status
Project Design Mitigation	
Green Technology	
The Terminal A Replacement Project will incorporate elements of sustainable design, including state-of-the-art green technologies to conserve energy and minimize pollution during construction and operation of the facility. This will be guided by the LEED® Green Building Rating System™.	**Implemented.** The Replacement Terminal A incorporates various green technologies, including use of non-toxic, recycled and renewable materials; master lighting control systems; photosensors; windows that maximize natural lighting; low E glass that reduces heat load; use of local materials for at least 20 percent of non-mechanical building materials; adhesives and sealants that have no or low VOCs; and water saving fixtures.
Delta Air Lines will apply to LEED certification of Terminal A and will use diligent efforts to obtain this certification. Through its design process Delta Air Lines will report to Massport periodically about its progress in obtaining LEED certification.	**Implemented.** Delta Air Lines and Massport achieved LEED certification of Terminal A and that commitment is reflected in the Lease Agreement between Massport and Delta Air Lines. The application was submitted during the spring of 2006 and LEED certification was awarded in June 2006.
Urban Design of Replacement Terminal	
Design the new terminal to attenuate noise and to fit in with the visual character of the surrounding area. Incorporate landscaping into the design.	**Implemented.** These requirements and considerations were taken into account during design. The satellite terminal acts as a sound barrier to Jeffries Point.
400-MHz Power and Preconditioned Air	
The Terminal A Replacement Project will provide gate power for the aircraft directly from a central facility, with aircraft preconditioned air provided from "point-of-use" systems at the gate.	**Implemented.** "Point-of-use" systems have been installed.
Logan TMA Participation	
Delta Air Lines, Inc. has joined Massport's Logan TMA. Delta Air Lines will designate an Employee Transportation Advisor at Terminal A to be the conduit between the Logan TMA Coordinator and Delta Air Lines employees.	**Implemented.** Delta Air Lines joined the Logan TMA and designated an Employee Transportation Advisor.
Additionally, Delta Air Lines will provide the following services as part of their Transportation Demand Management Program through the Logan TMA Transportation subsidy for full-time Delta Air Lines employees at Logan Airport; ride matching/carpooling; vanpooling; guaranteed ride home; preferential parking for HOVs; shuttle to and from employee parking.	**Implemented.** TDM services are provided through the Logan TMA.

Table 9-5 Replacement Terminal A Project Status Report (EOEA #12096) Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Recycling Program	
The Replacement Terminal A will be included in within Massport's terminal recycling program.	**Implemented.** Paper, plastic, aluminum, glass, and cardboard are recycled at Terminal A.
High Occupancy Vehicle Promotion	
HOV access can be accommodated on the departures level and will be designated near main entrances to the terminal building to ensure efficient and convenient unloading by air passengers who use these mode-types to access the Airport. *The inner-most curb of [the arrivals level] will be designated exclusively for HOVs and taxis, similar to the departures level.*	**Implemented.** HOV access has been incorporated into the final design. HOV lanes give HOV modes preferential access to Terminal A for passenger convenience at both the arrival and departure levels. The Airport Silver Line service has a dedicated stop at Terminal A on the inner-most curb.
Ground Service Equipment (GSE) Conversion	
In conjunction with the Project, Delta Air Lines will implement a program for conversion of its entire GSE fleet at Terminal A as soon as viable alternative fueled fleet vehicles become available and can be effectively integrated into Delta Air Lines' operations at Terminal A.	**Implemented.** Delta Air Lines continues to evaluate availability of alternative fuel vehicles for integration into its GSE fleet.
Delta Air Lines will introduce battery powered baggage tugs and belt loaders with the replacement terminal and convert this portion of the GSE fleet by the end of 2008. This represents over 40 percent of Delta Air Lines' current GSE fleet.	**Implemented.** The Terminal A design incorporates infrastructure for GSE charging. In September 2009, Massport approved a $3 million dollar loan to Delta Air Lines for the purchase of battery-powered baggage tugs and battery powered-baggage conveyor belt vehicles. Delta Air Lines purchased 50 electric baggage cart tugs, 25 electric baggage conveyor belt vehicles, and charging stations for each vehicle. The GSE charger installations have been completed, and are currently using electric GSE. An update on this conversion will be reported in the *2010 EDR*.
Delta Air Lines will also examine the feasibility of locating a Compressed Natural Gas (CNG) fill station at Terminal A. The availability of a CNG fueling station would facilitate conventionally-fueled vehicles to be replaced with CNG-fueled vehicles where this vehicle option is offered. Delta Air Lines will introduce these vehicles into its GSE fleet as soon as they become available and are determined to be feasible and practicable for use at Terminal A.	**Implemented.** Delta Air Lines examined the feasibility of locating the CNG fill station at Terminal A and determined it to be infeasible given that the GSE conversions are trending toward electric vehicles. A CNG fuel facility is available on the Airport.
Where new AFVs are developed and determined to be cost effective and in available supplies, Delta Air Lines will integrate their use into its Terminal A GSE fleet operations.	**Implemented.** As described earlier, Delta Air Lines has purchased electric baggage tugs and belt loaders and will continue to determine the feasibility of integrating other alternative fuel GSE.
Finally, Delta Air Lines will provide Massport with an annual status report/update on the GSE conversion program at Terminal A, for inclusion in Massport's annual ESPR.	**Implemented.** Terminal A includes electric charging stations for Delta Air Lines' electric ramp vehicles. Delta Air Lines is studying which AFVs and infrastructure are best suited for its future GSE operations.

Table 9-5 Replacement Terminal A Project Status Report (EOEA #12096) Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Pedestrians traveling between the West and Central Garages will be provided with enclosed elevated walkway connections between the terminal and the two parking garages. The walkways will be designed with features such as climate controls and other design features that will allow for safe and comfortable passage between the terminal and garage structures.	**Implemented.** Terminal A includes two enclosed connections to the existing Airport-wide pedestrian bridge system. There is a new bridge at the west end of the ticketing hall that reestablishes the connection to the pedestrian bridge to the West Garage and the Hilton Hotel. At the east end of the ticketing hall, a new bridge connects to the existing walkway between the Central Garage and Terminal B.
Pedestrian connections will be improved by the following measures: connections to elevated walkways, improved crosswalks, surface walks.	**Implemented.** These measures have been incorporated in the final design and include the connections to the garages and Terminal B as described above. The Arrivals level roadway design includes three crosswalks that are aligned symmetrically with the terminal exit vestibules. The project provides a new sidewalk along Harborside Drive.
Operational Mitigation Measures	
Minimizing nighttime movement of aircraft to and from hardstand positions.	**Implemented.** In accordance with the Noise Rules, Massport continues to restrict nighttime movement of aircraft under their own power between 10 PM and 7 AM, and Massport also requires towing during this time period.
Using single engine taxiing and pushback to the extent feasible and practicable, recognizing that such use always at the discretion of the pilot in charge of the aircraft based upon his or her experience and safety and operational considerations.	**Implemented.** Massport has conducted two surveys of Logan Airport air carriers (2006 and 2009) to understand the extent single engine taxiing is used at Logan Airport. Massport also issued a letter to air carriers in support of single engine taxiing when consistent with safety procedures in 2006. Massport is an active member of the FAA Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program on reducing noise and emissions. In 2009, Massport offered to facilitate the undertaking by the Massachusetts Institute of Technology (MIT) of a more detailed survey of pilots at Boston Logan to better understand the use of single engine taxiing. MIT completed its survey and issued a paper in March 2010 (provided in *Appendix L, Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations.*) The MIT survey confirms earlier Massport survey findings that single engine taxiing is an important operational measure used by airlines to conserve fuel and is extensively used at Logan Airport. Based on the more detailed survey results, Massport will tailor future communication to airlines to further encourage the use of single engine taxiing, when safe to do so, within the Logan Airport operational context. An update of this effort will be reported in the *2010 EDR*.
Testing alternative de-icing methods to reduce the amount of glycol usage.	**Ongoing.** Delta Air Lines will continue to investigate de-icing alternatives.

Table 9-5 Replacement Terminal A Project Status Report (EOEA #12096) Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Construction Period Mitigation	
Construction period mitigation will be incorporated into the contract documents and specifications governing the contractors and subcontractors constructing the Terminal A Replacement Project.	**Implemented.** Construction period mitigation requirements were in the contract specifications and were enforced during construction.
Massport and Delta Air Lines will employ a team of on-site resident engineers and inspectors to monitor contractors' compliance with all mitigation measures. These measures may be adjusted, as appropriate, to assure continued effectiveness in supporting Massport's construction period mitigation objectives.	**Implemented.** Construction period mitigation requirements were in the contract specifications and were enforced during construction.
Specific construction period mitigation is described below: Traffic Mitigation, Noise Mitigation, Air Quality Protection, Overall Project Construction Mitigation, Rodent Control.[1]	**Implemented.** Construction period mitigation requirements were in the contract specifications and were enforced during construction.

Note: Text in italics detailing the mitigation measures is excerpted from the Section 61 Findings submitted to the EOEA, August 31, 2001.
1 Details are available in the Section 61 Findings.

Airside of Terminal A Satellite

Logan Airside Improvements Planning Project - EOEA #10458

Permitting History

- Certificate on the Final EIR issued on June 15, 2001
- Section 61 Findings dated June 8, 2001 on the Final EIR
- In June 2002, the FAA filed a Final Environmental Impact Statement (FEIS) and issued the record of decision (ROD) in August 2002 approving a unidirectional runway and other improvements, but deferred a decision on the centerfield taxiway pending additional review by the FAA.
- In November 2003, the Superior Court of the Commonwealth modified a 1976 injunction prohibiting construction of a new runway at Logan Airport, pending further environmental review. The injunction modification allowed construction of the runway in accordance with the MEPA Certificate on the Final EIR and the FAA's ROD on the Final EIS.
- In accordance with the Secretary of EEA's Certificate on the Final EIR, Massport amended its final Section 61 Findings issued in 2001 to incorporate mitigation measures added or refined through the federal environmental review process. As a result, Massport amended its initial Section 61 Findings on October 21, 2004, to include mitigation measures required of it in the FAA's ROD.
- In April 2007, the FAA issued a ROD on the centerfield taxiway improvements based on its review of supplemental information.

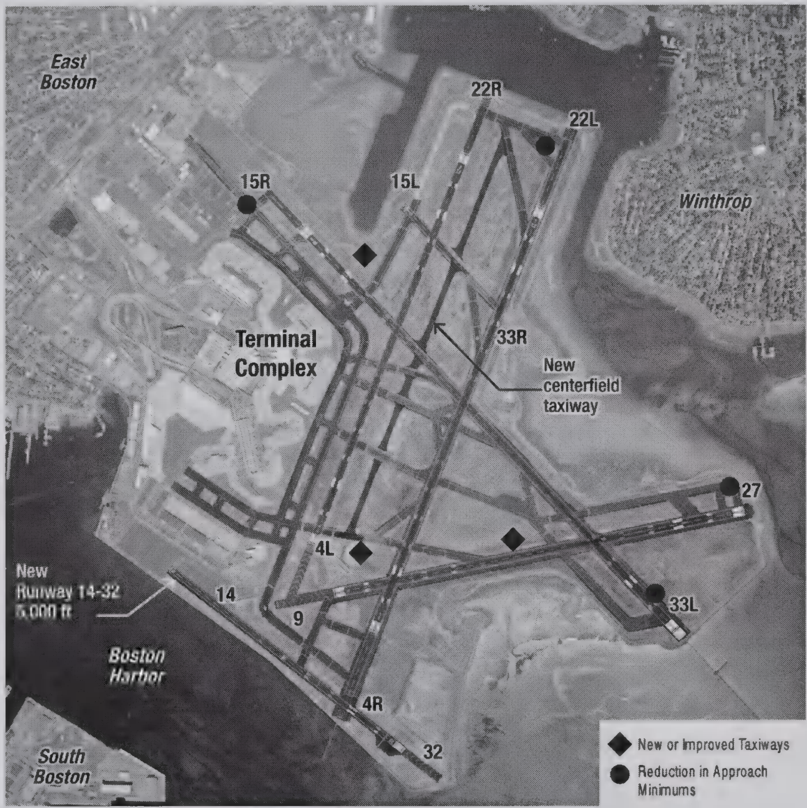
Project Status

- Project construction commenced in 2004. Runway 14-32 opened on November 23, 2006. 2007 was the first full year of operation of Runway 14-32.
- Construction of taxiway improvements was completed and fully operational in 2009.
- Realignment of the southwest corner taxiway system was completed in 2007.

The Logan Airside Improvements Planning Project (Figure 9-5) involved the construction of a new unidirectional Runway 14-32 and centerfield taxiway, extension of Taxiway D, realignment of Taxiway N, improvements to the southwest corner taxiway system, and reduction in approach minimums on Runways 22L, 27, 15R, and 33L. Reduction in approach minimums on Runway 15R and 33L were approved in the EIS. However, implementation depends upon realignment of the Instrument Landing System (ILS) localizer. The construction impacts of relocating the ILS localizer are being considered in the environmental review of the RSA enhancements for Runway 33L.

Table 9-6 summarizes the mitigation measures contained in the amended Section 61 Findings issued on October 21, 2004 and reports on the status of implementation.

Figure 9-5 Logan Airside Improvements



Note: Runway 14-32 construction completed in November, 2006.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009)

Project Design and Mitigation Measures	Status
Runway 14-32 Operations and Construction Mitigation	
Operational procedures for unidirectional Runway 14-32 will include over water flight operations only, arrival operations in east-to-west direction from Runway 32 approach end, and departure operations from west-to-east direction from the Runway 14 departure end. Massport will enter into contract with appropriate government body and/or community group(s) to enforce intended unidirectional runway, if requested. Lighting, marking, and instrumental components of Runway 14-32 will be designed for a unidirectional runway. No parallel or other type taxiway facility will be constructed to allow east-to-west direction departures from the Runway 32 end.	**Implemented.** Runway 14-32 was constructed for unidirectional operation. All lighting, marking and navigational instrumentation was constructed and is operated for unidirectional use only. There is no parallel or other type of taxiway facility that would facilitate east-to-west direction departures from the Runway 32 end. The construction mitigation measures were incorporated into the final design specifications and were implemented during construction. Runway 14-32 opened on November 23, 2006.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
FAA endorsed the unidirectional limitations on Runway 14-32 and has agreed to develop air traffic control procedures to ensure safe and efficient operation of the unidirectional limitation, subject to variances that may be required to accommodate particular aircraft emergencies.	
Wind-Restricted Use of Runway 14-32	
Restrict the use of Runway 14-32 to those times when winds are equal to or greater than 10 knots from the northwest or southeast (between 275 degrees and 005 degrees, or 095 degrees and 185 degrees, respectively).	**Implemented.** Massport compiles the necessary data and cooperates with FAA to facilitate its effort to implement the wind restriction in compliance with the federal ROD.
Mitigation Policies/Programs	
Regional Transportation Policy	
Engage in promoting increased utilization of regional airports *Cooperative transportation planning with the various transportation agencies to ensure an integrated regional transportation infrastructure, i.e., improved highways, public transportation, high-speed rail, private transportation services to improve regional airport access.*	**Implemented.** During 2001, Massport, together with the FAA and the six New England Regional State Aviation Directors developed a scope of work and selected a technical team to undertake the New England Regional Aviation System Plan (NERASP) Update study. In 2002, the Massport Board approved 10 percent funding with a 90 percent federal match toward the $1.6 million study.
Massport will continue to exercise operational control over Worcester Regional Airport.	**Implemented.** The Authority exercised operational control over Worcester Regional Airport as part of Massport's agreement with the City of Worcester which went into effect on January 15, 2000. In April 2004, Massport and the City of Worcester agreed to a three-year extension of the Operating Agreement, extending Massport's operation of the Logan Airport through June 2007. Subsequently, both parties agreed to a further extension and more recently (2009), legislation was passed requiring Massport to assume ownership of Worcester Regional Airport. Massport ownership of Worcester Regional Airport commenced on July 1, 2010.
Massport will continue to attract new air service to Worcester Regional Airport.	**Implemented.** Following the events of September 11, 2001, the last commercial operator, US Airways Express, ceased operations out of Worcester in early 2003. In 2003 and 2004, Massport continued to work with the City to attract passenger service for the Worcester Regional Airport. New service by Allegiant Airways commenced in December 2005 but ceased in September 2006. Commercial passenger service was regained when Direct Air began services in November 2008. That service continues to operate and has expanded from its initial Florida destinations to include South Carolina.
Traveler and air service awareness will be provided to Worcester Regional Airport via marketing campaigns.	**Implemented.** In 2009, Massport continued marketing of Worcester Regional Airport following the beginning of Direct Air commercial service at the airport in November 2008.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Develop and maintain an aviation information database to include: aviation trend tracking reports for distribution to interested parties; statistical summaries of passenger levels, aircraft operations and airline schedule data at major New England regional airports; include a summary of regional airport trends and service developments an Annual Report.	**Implemented.** Massport collects regional airport data. A detailed summary of individual airport activity is published annually in the EDRs.
Participate in other regional/state aviation forums.	**Implemented.** The NERASP study was completed in the fall of 2006. Massport continues to participate in regional and state aviation forums as they exist.
Continue to work with FAA/regional airport directors to complete a New England Airports System Study to evaluate regional airports performance. FAA committed to work with other participants in the preparation of the study.	**Implemented.** The NERASP Study was published in October 2006.
Encourage transportation initiatives (i.e., commuter rail, rail or other links between regional airports) by relevant agencies or other governmental bodies through Transportation Bond Bill or other legislative initiatives to implement an improved effective regional transportation system.	**Implemented.** Massport continues to provide support for regional transportation legislation and funding for other modes of transportation including the MBTA Silver Line and water transportation. Massport's continued support was instrumental in the 2001 opening of the Anderson Regional Transportation Center (RTC) in Woburn which provides a station building for ticketing, baggage and passenger services, approximately 2,400 parking spaces for daily and overnight parking, loading platforms for Logan Express and local buses, improved access from Interstate 93 via a new interchange constructed and opened by the Massachusetts Highway Department and a new high-level platform commuter rail station.
Continue to support inter-city rail planning through the Boston Metropolitan Planning Organization (MPO).	**Implemented.** Massport continues to participate in the Boston MPO and contributes to the policy discussions in all modes of transportation.
Allow Massport's Logan Express satellite parking lots and stations available for third-party bus and park-and-ride connections to other regional airports, including Worcester, Manchester, and Providence.	**Implemented.** Upon request and review, Massport will continue to allow third party bus operators to provide service to regional airports from Logan Express facilities. In 2007, Massport enacted an agreement with Manchester-Boston Regional Airport to allow operation of a shuttle service between Manchester-Boston Regional Airport and the RTC in Woburn. That pilot program was replaced by hourly van service in 2008.

**Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458)
Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)**

Mitigation Measure	Status
Residential Sound Insulation (RSIP)	
Sound insulation will be provided in the newly defined 1999 contour that will include affected residences in Chelsea, East Boston, and South Boston. Through special project mitigations, FAA funding will be provided for residences with building code considerations to allow for the necessary upgrades thereby ensuring eligibility and participation in the sound-insulation program. If FAA funding is unavailable to complete sound-insulation to residences within the new 65 db DNL contour as a result of project implementation, Massport will provide the funding. See *Chapter 6, Noise Abatement* for additional details on RSIP. *The FAA has committed to provide funding for a Massport sound-insulation program to address noise exposure within the 65 Day-Night Sound Level (DNL) contour that results from the implementation of the EIS Preferred Alternative for the Project as mitigated by the 10-knot wind restriction. In the event Federal funding is not available, Massport reiterates its commitment to provide funding for eligible homes. FAA also has agreed to fund building code upgrades to the extent necessary for sound-insulation.*	**Implemented.** The RSIP is being implemented in full compliance with state and federal regulatory requirements and mitigation commitments.
Tenant Relocation Assistance	
Construction of Runway 14-32 will result in the demolition of Cargo Buildings 60 and 61. Massport will provide assistance to eligible tenants in Building 60. The tenant of Building 61 will vacate. *FAA has committed to ensure that Massport's tenant relocation program is followed through appropriate conditions in federal grants. Massport will continue to comply with its commitments with respect to tenant relocation.*	**Implemented.** The tenant in Building 61 vacated the premises upon expiration of its lease. Massport provided relocation assistance to the eligible businesses in Building 60.
Vegetation	
Sediment and erosion controls will be implemented within the 100-foot buffer zone of the coastal bank.	**Implemented.** Sediment and erosion controls were installed prior to construction and maintained until disturbed areas stabilized.
Areas disturbed by construction will be stabilized with vegetation common to airfield once re-grading is completed.	**Implemented.** Massport stabilized the areas disturbed by construction once re-grading was completed.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Wildlife	
Alter existing airfield grassland mowing procedures prior to spring arrival of upland sandpiper to encourage occupation in other airfield areas other than the construction area implement a pre-construction upland sandpiper inspection program and conduct on-going pre-mowing to ensure no individual birds remain in the area, and encourage off-site habitat due to airfield safety.	**Implemented.**
Water Resources	
The existing storm-water drainage system will be reconfigured and a low-flow water quality treatment structure will be incorporated, if feasible.	**Implemented.** Massport incorporated these design specifications as part of the project's construction plan. Two water quality treatment structures have been integrated into the project.
FAA has reiterated the provisions of Section 7.0 of the Section 61 Findings and has committed to ensure compliance with these requirements and water quality Best Management Practices (BMPs) through its engineering oversight of the Project.	**Implemented.** Project design incorporates water quality elements and BMPs as described in the Final EIR. BMPs were implemented during project construction and operation of the runway. Similar measures were implemented during centerfield taxiway construction.
Preferential Runway Advisory System (PRAS)	
Massport will develop and implement a PRAS monitoring system and a new distribution system for reporting that will expand the contents of Massport's Quarterly Noise Reports and will involve the expansion of the distribution list to include the Logan Airport Citizens Advisory Committee (CAC). Runway utilization, dwell and persistence reports will be included in the ESPR filings with MEPA. Massport will continue to work with FAA to design additional reports to enhance the attainment of PRAS and Massport will begin to work with CAC to update PRAS. The current PRAS system will remain in place until superseded.	**Implemented.** Massport, FAA, and the CAC initiated a noise study of Logan Airport. PRAS review and reporting are incorporated into the requested noise study. Runway utilization, dwell and persistence reports continue to be included in ESPR and EDR filings with MEPA.
Noise Abatement Study	
FAA has committed to undertake a noise abatement study that will include enhancing existing or developing new noise abatement measures applicable to aircraft overflight impacts, which will take into account environmental benefit, operational impact, aviation safety and efficiency, and consistency with applicable legal requirements. The scope of this study has been completed through the joint efforts of FAA, the CAC, and Massport as required by the ROD. Massport will work with the CAC and FAA to assess the existing PRAS at Logan Airport in accordance with Section 10.0 of the Section 61 Findings and will continue to participate in the noise study as contemplated in the ROD.	**Implemented.** The FAA, in conjunction with Massport and the Logan Airport CAC, initiated the Boston Overflight Noise Study (BONS). Phase 1 of the study, completed in early 2007, defined and will seek to implement changes to flight tracks to minimize impacts from aircraft overflights which do not require a detailed Environmental Assessment. Federal funding for Phase 2 was requested early to ensure seamless continuation of the study and transition. Phase 2, the Boston Logan Airport Noise Study (BLANS), now underway, will address additional noise abatement alternatives that will require detailed analysis to meet FAA environmental requirements.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Peak Period Monitoring and Demand Management Program (DMP)	
Massport will develop and implement a Peak Period Pricing (PPP) program or an alternative DMP. Massport will identify standards to allow airlines to accurately predict scheduling costs and modify accordingly. Massport will establish and maintain a monitoring system. *Massport will comply with its commitments with respect to PPP or alternate DMP. FAA has indicated in the ROD that it stands ready to assist Massport in this endeavor.*	**Implemented.** In July 2004, Massport filed a proposed rule with the Office of the Massachusetts Secretary of State to formally initiate the state rulemaking process and public review of a proposed rule to establish a peak period surcharge during designated peak delay periods at Logan Airport. The filing was followed by a public comment period that lasted through November 15, 2004. During the comment period, Massport conducted two public hearings to receive comments on the proposed regulation. The Massport Board voted to establish the peak period surcharge program on January 16, 2005. The program has been in place since that date. *Appendix K, 2009 Peak Period Pricing Monitoring Report* includes a copy of Massport's Peak Period Pricing Monitoring Report for 2009.
Single Engine Taxi Procedures	
Develop and implement a program designed to maximize the use of single engine procedures by all tenant airlines, consistent with safety requirements, pilot judgment and Federal law requirements.	**Implemented.** Massport supports the use of single engine taxiing when it can be done safely, voluntarily and at the discretion of the pilot. Massport has conducted two surveys of Logan Airport air carriers (2006 and 2009) to understand the extent single engine taxiing is used at Logan Airport. Massport also issued a letter to air carriers in support of single engine taxiing when consistent with safety procedures in 2006. Massport is an active member of the FAA Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program on reducing noise and emissions. In 2009, Massport offered to facilitate the undertaking by MIT of a more detailed survey of pilots at Boston Logan to better understand the use of single engine taxiing. MIT completed its survey and issued a paper in March 2010 (provided in *Appendix L*). The MIT survey confirms earlier Massport survey findings that single engine taxiing is an important operational measure used by airlines to conserve fuel and is extensively used at Boston Logan. Based on the more detailed survey results, Massport will tailor future communication to airlines to further encourage the use of single engine taxiing, when safe to do so, within the Logan Airport operational context. An update of this effort will be reported in the *2010 EDR*.
General Construction Mitigation	
Traffic Mitigation	
Construction vehicles will use the Airport roadway system/State highways and be restricted from using Neptune Road, Maverick Street and Porter Street in East Boston. Construction employees (with the exception of some supervisory personnel) will be prohibited from on-site/on-Airport parking and will access the Airport via public transportation or shuttle service from designated off-site parking. Police details will be employed to ensure safety and to manage traffic at appropriate locations.	**Implemented.** Construction mitigation measures and practices were and will be maintained during construction.

Table 9-6 Logan Airside Improvements Planning Project (EOEA #10458) Details of Ongoing Section 61 Mitigation Measures (as of December 31, 2009) (Continued)

Mitigation Measure	Status
Air Quality Mitigation	
Require contractors to retrofit heavy construction equipment with advanced pollution control devices. Control dust by: street sweeping; applying water as needed and covering trucks hauling demolition and excavation site materials.	**Implemented.** Construction mitigation measures and practices were and will be maintained during construction.
Noise Mitigation	
Noise Control Techniques include the use of concrete crushers; use of local power grid to reduce generator use; attaching of intake and exhaust mufflers, shields or shrouds; use of noise deadening material to inside of hoppers, conveyor transport points, or chutes; ongoing equipment maintenance to ensure peak performance; limit equipment idling; limit use of public address systems/annunciators; limit use of gasoline driven hand tools; configure, where feasible, the construction site will be as far from noise-sensitive locations as possible. Nighttime construction schedule noise measures will be implemented including: prohibit, to appropriate extent, back-up alarms for all equipment; provide additional construction laborers to ensure backup safety and to comply with OSHA regulations; prohibit delivery trucks from tailgate slamming during paving operations; require contractors to turn off vibratory compactors prior to exiting off newly placed pavement and onto old existing pavement.	**Implemented.** Construction mitigation measures and practices were and will be maintained during construction.
Overall Construction Mitigation Monitoring	
Pre-construction Plans	
Develop a Health and Safety Plan (HASP), a site-specific Construction Stormwater Prevention Plan , a site Soil Management Plan, adopt Massachusetts Clean Air Construction Initiatives, develop Construction Employee Transportation Management Plan, develop detailed traffic maintenance plans, and develop construct specifications and standards for all contractors.	**Implemented.** Pre-construction plans were developed prior to commencement of construction in 2004.
Preferred Alternative Site Control/Security	
Conduct full agency coordination with the FAA, MBTA, MTA, MassDEP, CZM, MWRA, BWSC, and utility companies. Established an on-site team of resident engineers and inspectors.	**Implemented.**
Report on Progress of Logan TMA	**Implemented.** *Chapter 5, Ground Transportation* of the *2009 EDR* discusses the status of the Logan TMA and efforts to increase Logan TMA membership and overall HOV access to Logan Airport. Since MassRIDES began management of the Logan TMA in January 2006, the joint focus has been on expanding Logan TMA services, broadening HOV options, and supporting all major Logan Airport tenants to become members and actively participate in the Logan TMA. In 2007, the Logan TMA implemented three new programs: Sunrise Shuttles; Logan TMA Preferential Carpooling; and Commuter Cash program. In 2009, there were 2,746 employees of companies with Logan TMA membership.

Note: The mitigation measures in italics are those that were referenced in the FAA's ROD and later incorporated into the October 21, 2004 amended Section 61 Findings.

Recently Approved Projects with Upcoming Mitigation Requirements

Southwest Service Area (SWSA) Redevelopment Program, EEA # 14137

Permitting History

- Certificate on the Final EIR issued on May 28, 2010
- Section 61 Findings submitted to EEA on June 29, 2010

Project Status

Massport is redeveloping the SWSA at Logan Airport and will construct a new consolidated rental car facility and associated uses. Consolidation of the rental car operations and their shuttle buses into one coordinated operation will result in reduced vehicle miles traveled and associated air emissions.

Construction of some enabling projects commenced in late summer 2010 as final design of the facility proceeded. All ConRAC facilities (the Garage Structure, Customer Service Center (CSC), permanent Quick Turnaround Areas (QTAs) 1 and 2, and temporary QTAs 3 and 4) would be constructed first. By early 2015, the entire Program would be constructed and operational. Table 9-7 outlines the SWSA Redevelopment Program Section 61 commitments which Massport, the construction contractors, and the rental car companies will implement as part of the design, construction and operation of the facility.

Table 9-7 Southwest Service Area (SWSA) Redevelopment Program (EEA # 14137) Section 61 Mitigation Commitments to be Implemented

Mitigation Measure	Status
Site Design	
Stormwater Management	
Improve quality of runoff by upgrading stormwater management facilities site-wide, reducing the volume of flow to the Maverick Street Outfall by increasing pervious area site-wide, utilization of Low Impact Design elements, and replacing uncovered parking areas with buildings.	To be reported in the *2010 EDR*.
Design new sanitary and drainage systems to result in an overall reduction in combined sewer overflow volumes at the Porter Street Outfall and eliminate discharge to Maverick Street Outfall and Bird Island Flats/West Outfall.	To be reported in the *2010 EDR*.
Remediation and Underground Fuel Storage Systems	
Remove all existing car rental fueling systems and associated tanks and replace with current, state-of-the-art vehicle fueling and washing facilities.	To be reported in the *2010 EDR*.
Develop a Soil Management Plan and submit to the MassDEP prior to construction for the Activity and Use Limitations (AUL) areas.	To be reported in the *2010 EDR*.
During construction, the soil and groundwater environmental issues surrounding the existing rental car operations would be addressed in compliance with the Massachusetts Contingency Plan (MCP).	To be reported in the *2010 EDR*.

Table 9-7 Southwest Service Area (SWSA) Redevelopment Program (EEA # 14137) Section 61 Mitigation Commitments to be Implemented (Continued)

Mitigation Measure	Status
Noise Reduction Measures	
Eliminate individual rental car shuttle buses and combine Massport Airport Station buses (routes 22/33/55) through the Unified Bus System; thereby, reducing the overall number of rental car-related buses circulating on-airport and associated noise.	To be reported in the *2010 EDR*.
Incorporate noise reduction strategies into site design, such as solid fences/walls, gateway signs/walls, and landscaped berms.	To be reported in the *2010 EDR*.
Phase 2 SWSA Airport Edge Buffer and Other Site Landscaping	
Construct other site landscaping that encourages walking/biking by providing safe and welcoming corridors, reduces environmental impact (water efficient; reduce and filter runoff), and screens the SWSA from neighboring properties.	To be reported in the *2010 EDR*.
Building Design	
Energy Efficiency	
Optimize daylight and natural ventilation within the Garage Structure (a Code classification for an "open parking structure") to eliminate the need for substantial mechanical ventilation systems.	To be reported in the *2010 EDR*.
Reduce energy consumption by a minimum of 20 percent (as required by MA LEED Plus) by properly sizing building mechanical systems and incorporating high performance/energy efficient mechanical and electrical building systems, such as highly-reflective (high-albedo) roofing materials, reduced lighting intensities, high-efficient heating and cooling systems, and daylighting techniques with window and skylight glazing.	To be reported in the *2010 EDR*.
Reduce overall electricity consumption by 2.5 percent through the use of on-site renewable energy (which contributes to the overall 20 percent energy efficiency performance criteria above).	To be reported in the *2010 EDR*.
Conduct a third-party commissioning process to ensure the effectiveness of building systems (as required by MA LEED Plus).	To be reported in the *2010 EDR*.
Water Efficiency and Wastewater Reduction	
Reduce water use demand by a minimum of 20 percent (as required by MA LEED Plus) and to strive for a 30 percent reduction through utilization of high-efficient/ low-flow plumbing fixtures and car wash water reclamation systems.	To be reported in the *2010 EDR*.
Reduce water use demand and wastewater generation by reclaiming and reusing car washing water.	To be reported in the *2010 EDR*.

Table 9-7 Southwest Service Area (SWSA) Redevelopment Program (EEA # 14137) Section 61 Mitigation Commitments to be Implemented (Continued)

Mitigation Measure	Status
Potential collection of and reuse of stormwater runoff for irrigation of landscaped areas.	To be reported in the *2010 EDR.*
Noise Reduction Measures	
Improve the Quick Turnaround Areas (QTAs), including the elimination of outdoor loudspeakers, elimination of car drying blowers through state-of-the-art equipment, enclosed vacuum compressors, and incorporation of six to eight-foot high solid walls/fences designed to further reduce noise from activities at the QTA facilities, including car washing and vehicle movements.	To be reported in the *2010 EDR.*
Transportation and Parking	
Roadway Improvements	
Reconstruct Porter Street, including turnaround for exiting taxis.	To be reported in the *2010 EDR.*
Reconfigure SR-14 and new alignment of Ramp 1A-S.	To be reported in the *2010 EDR.*
Construct new dedicated Unified Bus System access and ramp off of SR-14.	To be reported in the *2010 EDR.*
Reconstruct traffic signals and pedestrian accommodations at the Harborside Drive/Porter Street intersection.	To be reported in the *2010 EDR.*
Reconstruct, widen and convert Jeffries Street to one-way northbound, between Harborside Drive and Tomahawk Drive.	To be reported in the *2010 EDR.*
Reconstruct traffic signals and pedestrian accommodations at the Harborside Drive/Jeffries Street intersection.	To be reported in the *2010 EDR.*
Construct the extension of Tomahawk Drive –a one-way westbound roadway connecting Harborside Drive with the Maverick Street Gate and Garage Structure.	To be reported in the *2010 EDR.*
Reconstruct traffic signals and pedestrian accommodations at the Harborside Drive/Hotel Drive intersection.	To be reported in the *2010 EDR.*
Reconfigure inbound lane of the Maverick Street Gate to provide additional queue storage.	To be reported in the *2010 EDR.*
Airport Transportation System Improvements	
Reduce the rental car shuttle bus fleet by approximately 70 percent through the creation of the Unified Bus System when compared to the 2007 Existing Condition and future No-Build/No-Action Conditions.	To be reported in the *2010 EDR.*
Reduce vehicle miles travelled (VMT) associated with rental car shuttling.	To be reported in the *2010 EDR.*

Table 9-7 Southwest Service Area (SWSA) Redevelopment Program (EEA # 14137) Section 61 Mitigation Commitments to be Implemented (Continued)

Mitigation Measure	Status
Reduce rental car shuttle bus terminal curbside congestion through the creation of the Unified Bus System resulting in reduced emissions.	To be reported in the *2010 EDR.*
Utilize clean- and low-emission fuel for the Unified Bus System to further reduce emissions.	To be reported in the *2010 EDR.*
Install Intelligent Transportation System features, as part of the Unified Bus System to further reduce emissions and improve operational efficiency.	To be reported in the *2010 EDR.*
Implement new wayfinding signage to increase the efficiency of the circulating vehicles within and around the SWSA.	To be reported in the *2010 EDR.*
Pedestrian and Bicycle Facilities	
Provide new pedestrian and bicycle facilities, including secure and covered bicycle storage at the Customer Service Center (CSC) and QTA buildings for employees, customers and the general public, as well as shower/changing facilities within the QTA buildings for employees.	To be reported in the *2010 EDR.*
Provide enhanced pedestrian connections to and from the SWSA, airport terminals, the Logan Office Center, Memorial Stadium Park, Bremen Street Park, the Harborwalk, on-airport buses, public transit (MBTA Airport Station), along Porter Street, and surrounding East Boston neighborhoods.	To be reported in the *2010 EDR.*
Provide street and pedestrian-level lighting and advanced warning signals and/or systems at crosswalks.	To be reported in the *2010 EDR.*
Transportation Demand Management (TDM) Plan	
Provide limited SWSA employee parking on-site.	To be reported in the *2010 EDR.*
Provide new access to public transit through the Unified Bus System (direct connection to MBTA Blue Line at Airport Station) and new/enhanced pedestrian facilities at the station.	To be reported in the *2010 EDR.*
Require rental car companies to participate in the Logan Transportation Management Association (TMA).	To be reported in the *2010 EDR.*
Alternative-Fuel Vehicles	
As presented under 'Rental Car Company-Related Environmental Commitments' below, the rental car companies would provide fuel-efficient and/or alternative-fueled rental vehicles (quantity to be determined by the rental car companies).	To be reported in the *2010 EDR.*
The current design guidelines for the Garage Structure include infrastructure necessary to accommodate future demands for electric plug-in stations, such as conduit and electrical capacity, and other alternative fuel sources such as E-85.	To be reported in the *2010 EDR.*

Table 9-7 Southwest Service Area (SWSA) Redevelopment Program (EEA # 14137) Section 61 Mitigation Commitments to be Implemented (Continued)

Mitigation Measure	Status
Off-Airport Improvements/Benefits	
Reconstruct Frankfort Street/Lovell Street intersection to provide a new traffic signal control and pedestrian-related improvements (for temporary impacts of the relocation of the Bus and Limousine Pools to the North Service Area (NSA) during construction).	To be reported in the *2010 EDR.*
Reduce the amount of off-airport car shuttling to and from off-airport locations, further reducing traffic on Route 1A and local roadways surrounding the airport due to the consolidated and expanded rental car "ready/return" parking spaces and QTA areas at the SWSA.	To be reported in the *2010 EDR.*
Construction Management	
Aim to divert/reduce construction waste to landfills.	To be reported in the *2010 EDR.*
Implement Erosion and Sedimentation Control Program.	To be reported in the *2010 EDR.*
Retrofit certain diesel construction equipment types with diesel oxidation catalyst and/or particulate filters (in accordance with the DEP Clean Air Construction Initiative).	To be reported in the *2010 EDR.*
Require the use of ultra-low sulfur diesel fuel for off-road construction vehicles and/or equipment.	To be reported in the *2010 EDR.*
Construction worker vehicle coordination and trip limitation, including requiring contractors to provide off-airport parking and use of high-occupancy vehicle transportation modes for employees.	To be reported in the *2010 EDR.*
To ensure no changes in the conditions of abutting homes due to pile driving, Massport will require the Contractor to inspect the conditions of the abutting homes prior to and following pile driving activities.	To be reported in the *2010 EDR.*

MEPA Appendices

- Appendix A – MEPA Certificate and Responses
- Appendix B – Comment Letters and Responses
- Appendix C – Proposed Scope for the *2010 EDR*
- Appendix D – Distribution

A

MEPA Certificate and Responses

- Secretary of the Executive Office of Energy and Environmental Affairs Certificate on the *Logan Airport 2008 Environmental Data Report (2008 EDR)* and Massport's Responses to Comments raised in the Certificate.
- Copies of the Secretary's Certificates issued for the reporting years 2004, 2005, 2006, and 2007.

Secretary of the Executive Office of Energy and Environmental Affairs Certificate on *2008 EDR* and Massport's Responses to Comments Raised in the Certificate

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

November 13, 2009

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE 2008 LOGAN AIRPORT ENVIRONMENTAL DATA REPORT

PROJECT NAME	: 2008 Environmental Data Report
PROJECT MUNICIPALITY	: Boston / Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 3247
PROJECT PROPONENT	: Massachusetts Port Authority
DATE NOTICED IN MONITOR	: October 7, 2009

As Secretary of Executive Office of Energy and Environmental Affairs (EEA), I hereby determine that the Environmental Data Report submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62I) and with its implementing regulations (301 CMR 11.00).

The environmental review process at Logan Airport has been structured to occur on two levels: airport-wide and project-specific. The Environmental Status and Planning Report (ESPR) has evolved from a largely retrospective status report on airport operations to a broader analysis that also provides a prospective assessment of long range plans. It has thus become (consistent with the objectives of the MEPA regulations) part of Massport's long range planning. The ESPR provides a "big picture" analysis of environmental impacts associated with current and anticipated levels of activities, and presents an overall mitigation strategy aimed at avoiding increases in such impacts. The ESPR analysis is supplemented by (and ultimately incorporates) the detailed analyses and mitigation commitments of project-specific EIRs. The ESPR is currently updated on a 5-year basis, with less detailed Environmental Data Reports (EDR) (formerly Annual Updates) filed in the years between ESPRs. The EDR addressing airport operations during 2008 is the subject of this Certificate.

In general, the EDR has fulfilled its purpose of providing a "snapshot" of year 2008 passenger and impact levels at Logan Airport. Most environmental parameters showed improvement in calendar year 2008. In particular, the technical studies in the 2008 EDR included reporting on and analysis of key indicators of airport activity levels, airport planning, the regional transportation system, ground access, noise, air quality, environmental management, and project mitigation tracking. Mitigation of noise impacts and air quality remain key concerns both of this office and the commenters. These commitments take the form of project-specific Section 61 Findings, as well as more general mitigation that has emerged from the ESPR process.

<u>Background</u>

In 1979, the Secretary of the Executive Office of Environmental Affairs issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the airport through a Generic Environmental Impact Report (GEIR). The Certificate also required the submission of interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR provided projections of environmental conditions where the cumulative effects of individual projects could be understood. The Secretary's Certificate on the *1997 Annual Update* proposed a revised environmental review process for Logan Airport. As a result, Massport evaluates the cumulative impacts associated with airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs.

The last Logan ESPR was filed for calendar year 2004. Following the recent sequence of annual environmental filings, the environmental filing scheduled for next year was previously anticipated to be in the form of an ESPR rather than an EDR. However, due to the current economic downturn, as described in this 2008 EDR, activity levels at Logan Airport and associated environmental impacts continue to remain well below historic levels and recent peaks. In 2009, near-term activity levels and associated environmental effects are also expected to remain well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the 2004 ESPR, the predicate upon which the ESPR schedule was initially
established, has not occurred. Therefore, I will allow Massport to prepare a 2009 EDR in lieu of A-1
the scheduled ESPR. The 2009 EDR should address the activity levels observed in 2009 in comparison with those predicted in the 2004 ESPR. The 2009 EDR should explain Massport's proposed schedule for filing the next ESPR in light of observed and expected activity levels and any other changes in airport operations that have occurred since the 2004 ESPR was filed.
Where appropriate, Massport must continue to identify and address any longer term aviation and A-2
environmental trends in each annual filing whether that will be in the form of an EDR or ESPR.

Review of the 2008 EDR and Scope for the 2009 EDR

Procedural for 2009 EDR

The 2009 EDR must provide an annual update on conditions at Logan Airport for calendar year 2009. The 2009 EDR should continue to serve as a background/context against which projects at Logan Airport can be evaluated. It should also report on the cumulative effects of Logan Airport operations and activities, compared to 2008. A-3

The 2009 EDR must respond to those issues explicitly noted in this Certificate and the comments received in the next EDR. A-4 The EDR should provide a "snapshot" of the 2009 operations and impacts, with more substantial analysis awaiting the next ESPR. A-5 Massport should file the 2009 EDR no later than October 15, 2010. A-6

A distribution list for the 2009 EDR (indicating those receiving documents, CDs, or Notices of Availability) should be provided in the document. A-7 This section must also include copies of all ESPR and EDR Certificates issued since the 2004 Logan Environmental Status and Planning Report (issued on August 16, 2006) to provide context for reviewers. A-8 Supporting technical appendices should be provided as necessary. A-9

Responses to Comments

The comments received on the 2008 EDR are thoughtful and detailed. The 2009 EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments included in this EDR is well-constructed and cross-referenced. Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity, where necessary. A-10

The majority of comments received on the 2008 EDR focused on air quality and noise related issues, including measurement of noise, modeling of noise contours, and noise abatement. In addition to responding to these comments, the 2009 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts. A-11 Massport should consult directly with individual commentors where appropriate. A-12

Organization of the Certificate

I have organized the remainder of this Certificate to respond to issues raised roughly in the order in which they were presented in the 2008 EDR, although I have for the most part incorporated discussion of issues raised in the technical appendix into the discussion of the environmental impact analyses.

Activity Levels

The Activity Levels chapter provides a solid analysis of major activity issues and the technical appendix contains useful and detailed information. This chapter presents aviation activity statistics for Logan Airport in 2008 and compares activity levels to the prior year including air passengers, aircraft operations, fleet mix, and cargo/mail volumes. The total number of air passengers at Logan Airport dropped to 26.1 million from 28.1 million in 2007. The decrease in the total number of air passengers was 7.1 percent. In addition, the total number of aircraft operations declined from 399,537 in 2007 to 371,604 in 2008, a decrease of 7 percent. The 2008 EDR also reports that the passenger aircraft operations decreased by 6.4 percent and operations by general aviation (GA) aircraft also declined by 16.8 percent from 2007. The average domestic load factor (average number of passengers per available seat) for flights also dropped to 72.8 percent, from 74.9 percent in 2007. However, the number of air passengers per aircraft operation was similar to the previous year with an average of 70.2 passengers per aircraft operation in 2008. In response to high and rising fuel prices and declining passenger demand, both low-cost carriers (LCCs) and legacy airlines reduced the number of aircraft operations at Logan Airport. Air cargo volumes, excluding mail, continued to decline from 632 million pounds in 2007 to 588 million pounds in 2008.

For the 2009 EDR, the Activity Levels chapter should include: A-13

- Aircraft operations, including fleet mix and scheduled airline services at Logan Airport;
- Passenger activity levels;
- Cargo and mail activities;
- A comparison of the 2009 aircraft operations, cargo/mail operations, and passenger activity levels to 2008 activity levels; and
- A report on national aviation trends in 2009 and a comparison to trends at Logan Airport.

In addition to reporting the analysis of major activity issues, I advise Massport to consider and attempt to address all comments related to activity levels in the 2009 EDR. A-14

Planning

The Airport Planning chapter provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2008. It also describes known future planning, construction, and permitting activities. In 2008 the replacement Signature Flight Support GA Facility in the North Cargo Area (NCA) was certified under the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Green Building Rating System. In addition, several other projects were also completed in 2008. The southwest corner taxiway system was realigned and the northern portion of the centerfield taxiway was constructed and was operational in 2008. Also Phase 1 of the Consolidated Maintenance Facility was constructed in the NCA and Phase 2, involving rehabilitation of the existing Facilities Building Number 2, began. Massport also completed renovations of the existing gas station in the NCA, which included installing Logan Airport's first E85 fuel dispensing tank. (E85 is an alcohol fuel

mixture that typically contains a mixture of up to 85 percent denatured ethanol and gasoline or other hydrocarbon.) In 2008 Massport also completed the final construction of the Bremen Street Park. In addition, a security wall was installed along the perimeter of the air operations area in the North Service Area.

For the 2009 EDR, the Airport Planning chapter should describe the status of planning initiatives for the: A-15

- Terminal Area;
- Airside Area;
- Service and Cargo Areas; and
- Airport Buffers and Landscaping.

The chapter should also report on the status of public works projects implemented by other agencies within the boundaries of Logan Airport. A-16 Massport should continue to assess planning strategies for improving Logan Airport's operations and services in a, safe, secure, efficient, and environmentally sensitive manner. A-17

Regional Transportation

In general, the 2008 EDR has met the requirements with respect to regional transportation issues. This chapter describes activity levels at New England's regional airports in 2008 and updates recent planning activities. Massport has demonstrated that it is coordinating its planning with other transportation agencies, and that this planning effort is aimed at minimizing cumulative impacts from Logan Airport operations. The 2008 EDR includes estimates of potential passenger diversions from Logan, and outlines how Massport planning encourages those diversions. The total number of air passengers utilizing New England's primary commercial service airports decreased from 47.2 million in 2007 to 44.4 million in 2008. This represents a passenger traffic decline of 5.9 percent. Activity levels as measured by the number of aircraft operations fell by 7.7 percent, from 1.31 million operations in 2007 to 1.21 million operations in 2008.

The decreases in passenger traffic and aircraft operations at New England airports reflect national trends in the face of volatile fuel prices and a worsening global economy. Specifically, of the 44.4 million air passengers using New England's primary commercial service airports, 59 percent of air passengers used Logan Airport in 2008 and 60 percent in 2007, as compared to 88 percent in 1995. In addition, air passenger traffic in the region fell more quickly than in the overall U.S. domestic market. As reported in the 2008 EDR, airlines introduced major reductions in operations through the year, eliminating less profitable routes and cutting frequencies in smaller markets. Fuel prices also forced airlines to ground less fuel efficient aircraft, as well as aircraft with high per seat operating costs, such as the small regional jets (with 50 seats or fewer) prevalent at the regional airports. As a result, the average number of seats per scheduled flight at the regional airports increased from 84 in 2007 to 88 in 2008. In comparison to 2007 levels, the operations by GA aircraft at New England regional airports declined by 7.6

percent. Declines in GA activity in New England also outpaced declines in the rest of the country. According to the FAA, GA activity fell by 5.6 percent nationally in 2008, due to high fuel costs resulting in a sharp decrease in recreational flying.

The directives in the ESPR Certificate were laid out to have Massport look at potential diversions, and explain how its planning and coordination with other agencies could impact potential diversions. The 2008 EDR has performed this task. A-18

I direct Massport to continue the directive from the ESPR Certificate for the 2009 EDR. In addition, for 2009 EDR the chapter on Regional Transportation should describe Logan Airport's role in the region's intercity transportation system by reporting on the following related to Regional Airports and Regional Transportation System: A-19

Regional Airports

- 2009 regional airport operations, passenger activity levels, and schedule data within an historical context;
- Status of plans and new improvements as provided by the regional airport authorities;
- Ground Access improvements to the regional airports; and
- The role that Worcester Regional Airport and Hanscom Field play in the regional aviation system and Massport's efforts to promote these airports.

Regional Transportation System

- Massport's efforts in strengthening the regional transportation system;
- Massport's cooperation with other transportation agencies to promote efficient regional highway and transit operations; and
- Report on metropolitan and regional rail initiatives and ridership.

<u>Ground Transportation</u>

The 2008 EDR serves its purpose of updating 2008 ground access conditions on the airport, and has also adequately addresses the updating of the three new programs to support employees' use of alternative transportation options.

This chapter reports on transit ridership, roadways, traffic volumes, and parking for 2008. Specifically, ground transportation activity levels associated with Logan Airport generally decreased for all surface transportation modes from 2007 to 2008 as a result of a 7 percent decline in the annual number of air passengers. In addition, the average daily traffic on Airport roadways decreased by 13 percent from 2007 to 2008, while vehicle miles traveled (VMT) decreased by 11 percent. This can be attributed directly to a decrease in annual passengers at the Airport. Air passenger ridership on Logan Express bus service also decreased by 14 percent in 2008 compared to 2007. However, Silver Line boardings at the Airport increased 5 percent. The increase in Silver Line ridership is likely due to new ridership as well as diversion from other services, such as from water transportation, limousines, and taxis. Ridership on water transportation decreased by 12 percent, limousine ridership decreased by 19 percent, and taxi

dispatches decreased 9 percent.

The 2008 EDR also documented that over the past several years, transit services have seen substantial increases in employee use. In 2008, the number of employees using Logan Express increased by 7 percent. In 2008, the Logan Transportation Management Association (Logan TMA) continued the operation of three programs that were introduced in 2007: 1) Sunrise Shuttle, which provides shuttle services between 3:00 A.M. and 5:30 A.M. for Airport employees who reside in East Boston; 2) Logan TMA Preferential Carpooling, which provides free parking at the West Garage to employees of Logan TMA member companies who carpool in groups of three or more; and 3) the Commuter Cash program, which financially rewards employees ($3/day) who switch from driving alone to either carpooling, bicycling, walking, or using public transportation. The number of vehicles parked on-Airport decreased by 14 percent in 2008 compared to 2007. The most significant change to the parking supply was the 40 percent reduction of spaces in the Economy Lot due to construction activities during most of the year.

The 2009 EDR should continue to update 2009 ground access conditions on the airport and report on the use of the three new programs to support employees' use of alternative transportation options. The chapter should also report on 2009 conditions and provide a comparison of 2009 findings to those of 2008 for the following: A-20 A-21

- High occupancy vehicle (HOV) ridership (including Blue Line, Silver Line, Scheduled, Unscheduled, Water Transportation, and Logan Express);
- Logan Airport Employee Transportation Management Association (Logan TMA) membership and services;
- Logan Airport gateway volumes;
- On-airport traffic volumes;
- On-airport vehicle miles traveled (VMT). VMT will be calculated using the updated model created in 2004 that is based on the full build roadway network;
- Parking demand and management (including rates and duration statistics); and
- Ground access management strategy.

Noise

The Noise Abatement chapter updates the status of the noise environment at Logan Airport in 2009, and describes Massport's efforts to reduce noise levels. The technical appendix contains useful and detailed information, while the main text provides a solid analysis of major noise issues. Many of the issues raised in the noise analysis are ongoing and require continuous monitoring, a point raised by several commenters. The future 2009 EDR represents an appropriate forum to serve this updating function.

The decrease in aircraft operations in 2008 led to changes in the noise environment. The 2008 Day-Night Sound Level (DNL) contours were smaller in almost all locations compared to 2007. The 65 decibel (dB) DNL contour decreased in size in East Boston pulling back from

across the Chelsea River to the East Boston waterfront. Over Winthrop and Revere, the DNL 65 dB contour decreased slightly with additional reductions out over Boston Harbor. The population exposed to noise levels greater than DNL 70 dB decreased in 2008 compared to 2007. In 2007, the population exposed to noise levels greater than DNL 70 dB was 416 but in 2008 the number dropped to 249. The overall number of people exposed to DNL values greater than 65 dB decreased 26 percent in 2008 compared to 2007. An estimated 5,968 people were exposed to DNL levels greater than 65 dB as depicted in the 2008 contour, compared to 8,099 in 2007. The residences exposed to DNL levels greater than 65 dB in 2008 are located within the 65 dB sound insulation contour, and thus are within areas that already have been sound insulated by Massport.

In 2008, Massport provided sound insulation to 388 homes, the majority of which were in Chelsea. The focus of this program in Chelsea is to fulfill federal and state mitigation commitments related to the opening of Runway 14-32. Since the inception of Massport's Sound Insulation program, 10,849 homes have received sound insulation in East Boston, South Boston, Winthrop, and Chelsea.

In 2008, Massport continued installing an improved Noise Monitoring System (NOMS). The flight tracking system and all new noise monitors were operational in 2008. Combined with new noise monitor software, the system has an improved capability of correlating measured noise events with individual flight tracks. This has greatly reduced differences between measured and modeled DNL values.

The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2009 EDR. A-22 I also strongly advise Massport to consider and address the comments received that have raised noise related concerns. Several commenters have requested further explanation of the reasons for the increased use of Runway 33L for jet aircraft departures and corresponding decrease in use of Runway 27. A-23 The comments from the Boston Transportation Department, the Town of Winthrop, the City of Cambridge, as well as from individuals such as Mr. Peter Koff and Ms. Nancy Timmerman have raised a number of concerns and suggestions related to noise that Massport should incorporate into the 2009 EDR. A-24

For 2009 the Noise Abatement chapter should provide an overview of the environmental regulatory framework affecting aircraft noise, the changes in aircraft noise, and the updates in noise modeling. A-25 The chapter should report on 2009 conditions and compare 2009 conditions to those of 2008 for the following:

- Fleet Mix, including Stage II, Recertified (Hushkitted) Stage III, newly manufactured Stage III, and any qualifying Stage IV aircraft; A-26
- Nighttime operations;
- Runway utilization (report on aircraft and airline adherence with runway utilization goals);
- Preferential runway advisory system (PRAS) compliance; and
- Flight tracks, including a discussion of the update on the Standard Terminal Automation

Replacement System (STARS) radar and consolidation of the Boston Terminal Radar Approach Control (TRACON) at Merrimac, plus Massport's installation and use of PASSUR data. A-26 cont'd

The chapter should also report on 2009 conditions and compare those to 2008 conditions for the following noise indicators:

- Using the Federal Aviation Administration's (FAA) most current version of the Integrated Noise Model (INM), and RealContours and RealProfiles, produce an accurate set of Day-Night Sound Level (DNL) noise contours. Adjustments made to account for over-water sound propagation and the propagation of sound to areas of higher terrain will be reported;
- Noise-impacted population;
- Measured versus modeled noise values, including reasons for differences and any improvements attributable to the use of RealContours and RealProfiles;
- Cumulative Noise Index (CNI);
- Times-Above for 65, 75, and 85 dBA threshold values;
- Installation and benefits of the new noise monitoring system; and
- Flight track monitoring noise quarterly reports.

A-27

The chapter should also report on noise abatement efforts and provide a status update on the new noise and operations monitoring system. A-28

Air Quality

The Air Quality/Emissions Reduction chapter provides an overview of airport-related air quality issues in 2008 and efforts to reduce emissions. The modeled emissions inventory results were driven principally by three factors: the lower number of aircraft operations at Logan Airport compared to 2007; the reported change in the aircraft average taxi/delay times at the Airport; and continual improvements to the FAA Emissions and Dispersion Modeling System (EDMS), v5.1, which has revised methods for calculating particulate matter (PM) and hydrocarbon (HC) emissions from aircraft engines, and has new functionality of calculating PM emissions from auxiliary power units (APUs). Because of the changes to the EDMS model and decreased air traffic, total emissions of PM10/PM2.5 associated with Logan Airport have decreased by approximately 37 percent to 81 kilograms per day (kg/day) compared to 2007 levels. By comparison, using the earlier version of EDMS total emissions of PM10/PM2.5 would have decreased by approximately 20 percent to 102 kg/day. This difference is attributed to modifications in the EDMS versions.

The 2008 EDR reports that the total emissions of volatile organic compounds (VOC) were 1,208 kg/day, or 28 percent lower than 2007 levels. The total emissions of carbon monoxide (CO) were 8,361 kg/day, or 9 percent lower than 2007 levels and the total emissions of

oxides of nitrogen (NOX) were 4,204 kg/day, or 6 percent lower than 2007 levels. In 2008, total NOx emissions at Logan Airport (net total with reductions) were approximately 656 tons per year (tpy) lower than Massport's 1999 Air Quality Index (AQI) benchmark. This represents a 28 percent decrease in NOx emissions since 1999. The 2008 EDR notes that other contributing factors to the results of the emissions inventory include the change in stationary source fuel usage, and the change in VMT and parking volumes. Air quality initiatives in place at the Airport and other ongoing efforts by Massport to minimize emissions also played a role. For example, there is a continuing trend of decreasing nitrogen dioxide (NO2) concentrations at both the Massport and Massachusetts Department of Environmental Protection (MassDEP) monitoring sites located in the general vicinity of Logan Airport since 1999. In addition, the annual NO2 concentrations at all monitoring locations in 2008 were well within the National Ambient Air Quality Standards (NAAQS) for NO2.

For the second year, Massport prepared an emission inventory of greenhouse gas (GHG) emissions directly and indirectly associated with Logan Airport. "Direct" GHG emissions are those that occur in areas located within the Airport's geographic boundaries and "indirect emissions" are those that occur off the Airport site. "Direct" GHG emissions associated with Logan Airport were 0.35 million metric tons (MMT), and the sum of "direct" and "indirect" emissions was 0.65 MMT, or less than 1 percent of statewide totals. Massport operations at Logan Airport contribute only 18 percent of these combined totals. GHG emissions in 2008 were 6 percent lower than 2007 levels.

As part of the Section 61 findings for the centerfield taxiway component, the first phase of a two-phase Massport Air Quality Monitoring Study was initiated in September 2007 at ten locations on- and off-airport using both real time and time-integrated methods to measure fine particulates, volatile organic compounds (VOC), carbonyls, black carbon, and polynuclear aromatic hydrocarbons (PAHs). The 2008 EDR states that this first phase commenced in September 2007 and was completed September 2008, with a report summarizing the findings expected to be completed before the end of 2009. Massport has committed to post this report on Massport's website when completed. The study collected ambient data on a variety of air pollutants over a two year period and assessed air quality changes due to the operation of the new centerfield taxiway. Massport should consult with the Massachusetts Department of Public Health (DPH), the Massachusetts Department of Environmental Protection (MassDEP), the City of Boston Environment Department and Boston Public Health Commission (BPHC) to discuss the second phase of the protocol. A-29

The 2009 EDR should continue updates on the information presented in the 2008 EDR and address comments received related to air quality. For 2009 the Air Quality/Emissions Reductions chapter should include an overview of the environmental regulatory framework affecting aircraft emissions, changes in aircraft emissions, and the changes in air quality modeling. A-30 The chapter should also discuss analysis methodologies and assumptions and report on 2009 conditions using the most recent versions of the Emissions Dispersion Modeling System A-31

(EDMS) and MOBILE motor vehicle emissions. The chapter should also include:

- Emissions inventory for carbon monoxide (CO);
- Emissions inventory for oxides of nitrogen (NOx);
- Emissions inventory for volatile organic compounds (VOCs);
- Emissions inventory for particulate matter (PM);
- Nitrogen dioxide (NO2) monitoring; and
- NOx emissions by airline.

A-32

This chapter should also report on the following air quality initiatives (AQI) for 2009:

- Air Quality Initiative Tracking;
- Massport's and Tenant's Alternative Fuel Vehicle Programs; and
- The status of other Logan Airport air quality studies undertaken by Massport or others.

A-33

The Air Quality Chapter should also include an inventory of GHG emissions from Logan Airport in 2009. GHG emissions should be quantified for aircraft, GSE, motor vehicles and stationary sources using emission factors and methodologies outlined in the Greenhouse Gas Emissions Policy and Protocol issued by EEA. The results of the 2009 GHG emissions inventory should be compared to the 2008 results. The 2008 EDR indicates that Massport commissioned a study to evaluate operational, economic and environmental benefits of cogeneration as a way reduce air emissions associated with the Central Utility Plant. If cogeneration is found feasible, energy consumption could be reduced Airport-wide as could the emissions of criteria pollutants (i.e., CO, NOx, etc.) and GHGs. The status of this study is not described. Therefore, an update should be provided in the 2009 EDR.

A-34

A-35

Water Quality/Environmental Compliance

This chapter describes Massport's ongoing environmental management activities including NPDES compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan, and tank management. In accordance with the requirements of the current NPDES permit for Logan Airport that was issued on July 31, 2007, Massport and all 27 co-permittees and tenants began preparation of updated Stormwater Pollution Prevention Plan (SWPPP). Massport completed its SWPPP in December of 2007 and tenant SWPPPs were completed in March 2008. Massport's SWPPP addresses stormwater pollutants in general, and also addresses deicing and anti-icing chemical, potential bacteria, fuel and oil, and other sources of stormwater pollutants.

The 2008 Annual Certificates of Compliance were submitted to U.S. Environmental Protection Agency and MA DEP in December 2008 for Massport and each co-permittee. Three out of a total of 73 outfall samples exceeded the regulatory limits of the National Pollutant Discharge Elimination System (NPDES) Program permit for the Airport's permitted outfalls. Two out of 23 samples exceeded the limits at the Maverick Street Outfall and one out of 24 samples exceeded a limit at the West Outfall. Over the past five years, the number of samples that exceeded the regulatory limits has ranged from three (2007) to eight (2005). Due to the large

size of the drainage areas and relatively low concentration of pollutants, it is typically not possible to trace exceedances to specific events. Where a known event, such as a spill, is reported, Massport routinely checks the drainage system for possible impacts from the event and takes corrective actions if necessary.

In accordance with the Massachusetts Contingency Plan (MCP), the 2008 EDR reports that Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. The 2008 EDR states that Massport is working towards achieving regulatory closure of the remaining MCP sites. In addition, preparation of the Environmental Management System (EMS) for facilities, where fleet and field maintenance activities are conducted, was on-going in 2008.

For 2009 the Water Quality/Environmental Compliance and Management chapter should report on the 2009 status of: A-36

- National Pollutant Discharge Elimination System (NPDES) Permit and monitoring results for Logan Airport's outfalls and the Fire Training Facility
- Jet fuel usage and spills
- Massachusetts Contingency Plan (MCP) Activities
- Tank Management
- Update on the environmental management plan
- Fuel spill prevention
- Future stormwater management improvements (if any)
- Future MCP and tank management activities

Massport should continue to report in the 2009 EDR how Massport will assess, remediate, and bring to regulatory closure areas of subsurface contamination.

<u>Sustainability at Logan Airport</u>

This chapter describes Massport's airport wide sustainability goals. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable design principles. In October 2004, the Massport Sustainability Team produced the *Massachusetts Port Authority Sustainability Plan* (Sustainability Plan). The Environmental Management Policy is incorporated in the Sustainability Plan as Massport's long-term sustainability goal or vision.

This chapter describes Massport's continued efforts including Massport-wide sustainability and details how sustainability is incorporated into many aspects of Massport's activities: Planning and Design; Construction; Operations, Maintenance and Management; and Monitoring of Environmental Performance which are detailed in this chapter. The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2009 EDR. A-37

The 2008 EDR outlines how Massport is committed to sustainable practices to help reduce impacts associated with construction. For example, Massport requires contractors to comply with construction guidelines regarding demolition waste recycling, soil reuse, and air emissions from construction equipment. In addition, in 2008, Logan Airport became the first airport in the U.S. to use warm mix asphalt for its airfield pavement (Runway 4R). Warm-mix as opposed to hot-mix asphalt is heated to a lower temperature, which saves energy resulting in 20 percent lower GHG emissions than hot-mix asphalt. It also contains 18 percent recycled material. Another environmental benefit of warm mix asphalt is that it can be applied in a thicker layer, requiring fewer passes with construction vehicles and fewer emissions of associated pollutants.

Massport has several programs in place that contribute to the environmentally sustainable operation and maintenance of Logan Airport and its facilities. Massport also encourages its tenants to do the same. These programs and other sustainability initiatives include developing a policy that states that new development projects obtain certification under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™ and include LEED accredited professionals on the design team. Massport is also establishing and implementing an Alternative Fuel Vehicle Policy (AFV) Policy that requires key personnel to review and consider AFVs when there is a request for a new or replacement vehicle and to select AFVs unless there is a compelling reason not to. In March 2008, Massport installed twenty 10-foot-tall wind turbines on the roof of Logan Office Center. The wind turbines are expected to generate approximately 100,000 kWh annually, or about 2 percent of the building's monthly energy use.

In 2008 Massport completed renovations to the existing gas station in the NCA to include installing an E85 fuel dispensing tank. As discussed earlier in this Certificate, E85 is a first-generation biofuel. Massport also established a bicycle security program with State Police Troopers providing additional patrols on bicycle, which helps to reduce vehicle-related emissions and fossil fuel use. Finally, Massport created preferred parking areas in garages and parking areas throughout Logan Aiport to promote use of lower emitting vehicles. I commend Massport for the existing and planned sustainability measures.

For 2009, this chapter should report on the status of mitigation commitments for specific Massport and tenant projects at Logan Airport that have commenced construction. The mitigation commitments were made in the Section 61 Findings for the following projects which should be reported: A-38

- West Garage/Central Garage;
- International Gateway;
- Runway Ends 22R and 33L Safety Improvements;
- Replacement Terminal A; and
- Logan Airside Improvements Planning.

This chapter should also update the status of Massport's mitigation commitments and identify ↓ A-39

projects for which mitigation is complete. A-39 cont'd

Conclusion

I have determined that the 2008 EDR for Logan Airport has adequately compiled with MEPA and that Massport may prepare a 2009 EDR in lieu of a multi-year ESPR for submission in 2010. As I stated at the beginning of this Certificate, the 2009 EDR must provide responses to the issues raised in comments received. A-40 The 2009 EDR must include a copy of this Certificate and a copy of each comment letter received on the 2008 EDR. A-41 In particular, Massport should provide a thorough examination of issues raised regarding individual noise monitoring locations, noise measurement and modeling, noise abatement, and air quality issues. A-42 Massport should consult directly with individual commentors where appropriate. A-43

November 13, 2009
Date

Ian A. Bowles

Comments Received:

10/26/2009	Peter L. Koff, Engel & Schultz, LLP
10/28/2009	Town of Winthrop, Noise Air Pollution & Airport Hazards Committee
11/05/2009	Nancy Timmerman
11/06/2009	City of Cambridge, Robert Healy, City Manager
11/09/2009	Boston Transportation Department
11/10/2009	City of Boston Environment Department

IAB/ACC/acc

Comment #	Author	Topic	Comment	Response
A.1	Ian A. Bowles. Secretary	MEPA/Activity Levels	[T]he forecasted aviation growth presented in the 2004 Environmental Status and Planning Report (ESPR), the predicate upon which the ESPR schedule was initially established, has not occurred. Therefore, I will allow Massport to prepare a 2009 Environmental Date Report (EDR) in lieu of the scheduled ESPR. The 2009 EDR should address activity levels observed in 2009 in comparison with those predicted in the 2004 ESPR. The 2009 EDR should explain Massport's proposed schedule for filing the next ESPR in light of observed and expected activity levels and any other changes in airport operations that have occurred since the 2004 ESPR was filed.	As described in the cover letter and part of the proposed 2010 scope, Massport plans to file a *2010 EDR,* followed by a *2011 ESPR.*
A.2	Ian A. Bowles. Secretary	Activity Levels	Massport must continue to identify and address any longer term aviation and environmental trends in each annual filing whether that will be in the form of an EDR or an ESPR	Massport will continue to identify and address any longer term aviation and environmental trends in each annual filing. *Chapter 2, Activity Levels,* describes changing trends.
A.3	Ian A. Bowles. Secretary	Activity Levels	The 2009 EDR must provide an annual update on conditions at Logan Airport for calendar year 2009. The 2009 EDR should continue to serve as a background/context against which projects at Logan Airport can be evaluated. It should also report on the cumulative effects of Logan Airport operations and activities, compared to 2008.	As requested, the *2009 EDR* provides an update on 2009 conditions. Where it is helpful, multiple-year data are presented in tabular form. See *Chapter 2, Activity Levels.*
A.4	Ian A. Bowles. Secretary	MEPA	The 2009 EDR must respond to those issues explicitly noted in this Certificate and the comments received in the next EDR.	Individual responses to comments are provided in this Appendix to the *2009 EDR.*
A.5	Ian A. Bowles. Secretary	Activity Levels	The EDR should provide a "snapshot" of the 2009 operations and impacts, with more substantial analysis awaiting the next ESPR.	As requested, this *2009 EDR* provides a "snapshot" of the 2009 operations and impacts.
A.6	Ian A. Bowles. Secretary	MEPA	Massport should file the 2009 EDR no later than October 15, 2010.	This *2009 EDR* was filed on September 30, 2010.
A.7	Ian A. Bowles. Secretary+B8	MEPA	A distribution list for the 2009 EDR (indicating those receiving documents, CDs, or Notices of Availability) should be provided in the document.	The distribution list for the *2009 EDR* is shown in *Appendix D.*
A.8	Ian A. Bowles. Secretary	MEPA	This section [appendices] must also include copies of all ESPR and EDR Certificates issued since the 2004 Logan ESPR to provide context for viewers.	The ESPR and EDR certificates for previous reporting years back to 2004 are provided in *Appendix A.*
A.9	Ian A. Bowles. Secretary	MEPA	Supporting technical appendices should be provided as necessary.	Technical appendices are provided for each chapter as necessary.

Comment #	Author	Topic	Comment	Response
A.10	Ian A. Bowles. Secretary	MEPA	The 2009 EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments included in this EDR is well-constructed and cross-referenced. Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity,	Individual responses to comments are provided in Appendices A and B of this *2009 EDR*.
A.11	Ian A. Bowles. Secretary	Noise	[T]he 2009 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts.	A detailed discussion of Massport's noise tracking and abatement efforts at Logan Airport is provided in *Chapter 6, Noise Abatement* of this EDR.
A.12	Ian A. Bowles. Secretary	MEPA	Massport should consult directly with individual commenters where appropriate.	Massport consulted with the agencies listed and others, as appropriate.
A.13	Ian A. Bowles. Secretary	Activity Levels	For the 2009 EDR, the Activity Levels chapter should include: aircraft operations, including fleet mix and scheduled airline services at Logan Airport; passenger activity levels; cargo and mail activities; a comparison of the 2009 aircraft operations, cargo/mail operations, and passenger activity levels to 2008 activity levels; and a report on national aviation trends in 2009 and a comparison to trends at Logan Airport.	This *2009 EDR* includes a report on national aviation trends in 2009 and compares these to trends at Logan Airport. See *Chapter 2, Activity Levels.*
A.14	Ian A. Bowles. Secretary	Activity Levels	In addition to reporting the analysis of major activity issues, I advise Massport to consider and attempt to address all comments related to activity levels in the 2008 EDR.	For 2009, Massport reports on aircraft operations (including fleet mix and scheduled airline service at Logan), passenger activity levels, cargo and mail activities, and compare these to 2008 activity levels. See *Chapter 2, Activity Levels* .
A.15	Ian A. Bowles. Secretary	Airport Planning	For the 2009 EDR, the Airport Planning chapter should describe the status of planning initiatives for the: Terminal Area; Airside Area; Service and Cargo Areas; and Airport Buffers and Landscaping.	Updates on the status of the Terminal Area, Airside Area, Service and Cargo Areas, and Airport Buffers and Landscaping are provided in *Chapter 3, Airport Planning.*
A.16	Ian A. Bowles. Secretary	Airport Planning	The chapter should also report on the status of public works projects implemented by other agencies within the boundaries of Logan Airport.	*Chapter 3, Airport Planning,* includes the status of public works projects at Logan Airport.
A.17	Ian A. Bowles. Secretary	Airport Planning	Massport should continue to assess planning strategies for improving Logan Airport's operations and services in a safe, secure, efficient, and environmentally sensitive manner.	As part of planning for the safe and efficient operation of Logan Airport, Massport is mindful of environmental concerns and seeks to reduce the environmental impacts associated with Logan Airport activities.

Comment #	Author	Topic	Comment	Response
A.18	Ian A. Bowles. Secretary	Regional Transportation	The directives in the ESPR Certificate were laid out to have Massport look at potential diversions, and explain how its planning and coordination with other agencies could impact potential diversions. The 2008 EDR has performed this task. I direct Massport to continue the directive from the ESPR Certificate for the 2009 EDR.	The *2009 EDR* describes Massport collaboration with other regional transportation organizations in planning for the region's transportation needs. See *Chapter 4, Regional Transportation.*
A.19	Ian A. Bowles. Secretary	Regional Transportation	[The] 2009 EDR the chapter on Regional Transportation should describe Logan Airport's role in the region's intercity transportation system by reporting on the following related to Regional Airports and Regional Transportation System: *Regional Airports:* 2009 regional airport operations, passenger activity levels, and schedule data within an historical context; status of plans and new improvements as provided by the regional airport authorities; ground access improvements to the regional airports; and the role that Worcester Regional Airport and Hanscom Field play in the regional aviation system and Massport's efforts to promote these airports. *Regional Transportation System:* Massport's efforts in strengthening the regional transportation system; Massport's cooperation with other transportation agencies to promote efficient regional highway and transit operations; and report on metropolitan and regional rail initiatives and ridership.	The *2009 EDR* reports on regional airport operations, passenger activity levels and schedule data within an historical context; status of plans and new improvements; ground access improvements; the role of Worcester Airport and Hanscom Field in the regional aviation system, and Massport's efforts to promote them.
A.20	Ian A. Bowles. Secretary	Ground Transportation	The 2009 EDR should continue to update 2009 ground access conditions on the airport and report on the use of programs to support employees' use of alternative transportation options.	The *2009 EDR* provides an update on 2009 ground access conditions and employees' use of alternative transportation programs. See *Chapter 5, Ground Transportation.*
A.21	Ian A. Bowles. Secretary	Ground Transportation	The chapter should also report on 2009 conditions and provide a comparison of 2009 findings to those of 2008 for the following: high occupancy vehicle (HOV) ridership (including Blue Line, Silver Line, Scheduled, Unscheduled, Water Transportation, and Logan Express); Logan Airport Employee Transportation Management Association (Logan TMA) membership and services; Logan Airport gateway volumes; on-airport traffic volumes; on-airport vehicle miles traveled (VMT). VMT will be calculated using the updated model created in 2004 that is based on the full build roadway network; parking demand and management (including rates and duration statistics); and ground access management strategy.	*Chapter 5, Ground Transportation* , reports on 2009 conditions and compares 2009 findings to those of 2008: for HOV ridership, Logan TMA membership, Logan gateway volumes, on-airport traffic volumes, on-airport VMT, parking demand and management, and ground access management strategy.

Comment #	Author	Topic	Comment	Response
A.22	Ian A. Bowles. Secretary	Noise	The information in [the Noise chapter] is very informative and I encourage Massport to continue with its updates in the 2009 EDR.	Information on noise is provided in *Chapter 6, Noise Abatement* of this *2009 EDR.*
A.23	Ian A. Bowles. Secretary	Noise	I also strongly advise Massport to consider and address the comments received that have raised noise related concerns. Several commenters have requested further explanation of the reasons for the increased use of Runway 33L for jet aircraft departures and corresponding decrease in use of Runway 27.	Massport has added information to the runway use sections of each of the *2007, 2008* and *2009 EDRs* since Runway 14-32 opened. The runway use table (Table 6-4) shows that since the opening of Runway 14-32 FAA has preferred the use of the longer Runway 33L for departures rather than Runway 27. Also during this time, various runway closures due to construction have affected the parallels 4L-22R and 4R-22L and Runway 9-27. The use of Runway 33L for departures instead of Runway 27 when in that configuration is a dynamic operational decision made by the FAA controllers based on many factors, including winds, weather, fleet mix, and airfield conditions. FAA controllers, based on operational conditions, will chose the primary runway most appropriate for departures.
A.24	Ian A. Bowles. Secretary	Noise	The comments from the Boston Transportation Department, the Town of Winthrop, the City of Cambridge, as well as from individuals such as Mr. Peter Koff and Ms. Nancy Timmerman have raised a number of concerns and suggestions related to noise that Massport should incorporate in to the 2009 EDR.	The comments raised by reviewers are addressed and responded to in *Appendix A.*
A.25	Ian A. Bowles. Secretary	Noise	The noise abatement chapter should provide an overview of the environmental regulatory framework affecting aircraft noise, the changes in aircraft noise, and the updates in noise modeling.	*Chapter 6, Noise Abatement* provides information on the requested topics.
A.26	Ian A. Bowles. Secretary	Noise	The chapter should report on 2009 conditions and compare 2009 conditions to those of 2008 for the following: fleet mix, including Stage II, Recertified (Hushkitted) Stage III, newly manufactured Stage III, and any qualifying Stage IV aircraft; nighttime operations; runway utilization (report on aircraft and airline adherence with runway utilization goals; Preferential runway advisory system (PRAS) compliance; flight tracks, including a discussion of the update on the Standard Terminal Automation Replacement System (STARS) radar and consolidation of the Boston Terminal Radar Approach Control (TRACON) at Merrimac, plus Massport's installation and use of PASSUR data.	Massport reports on 2009 conditions and compares them to those of 2008 for the following: fleet mix including: Stage II, Recertified Stage II, newly manufactured Stage III, and qualifying Stage IV aircraft; nighttime operations; runway utilization; PRAS compliance; and flight tracks. See *Chapter 6, Noise Abatement.*

Comment #	Author	Topic	Comment	Response
A.27	Ian A. Bowles. Secretary	Noise	The chapter should also report on 2009 conditions and compare those to 2009 conditions for the following noise indicators : Using FAA's most current version of the Integrated Noise Model (INM) and RealContours and RealProfiles, produce an accurate set of Day-Night Sound Level (DNL) noise contours. Adjustments made to account for over-water sound propagation and the propagation of sound to areas of higher terrain will be reported; noise-impacted population; measured versus modeled noise values, including reasons for differences and any improvements attributable to the use of RealContours and RealProfiles; Cumulative Noise Index (CNI); Times-Above for 65,75,85 dBA threshold values; installation and benefits of the new noise monitoring system; and flight track monitoring noise quarterly reports.	The *2009 EDR* reports on 2009 conditions and compares them to those of 2008 for the following noise parameters: DNL noise contours, noise impacted population, measured versus modeled noise values, CNI, Times-Above for 65,75, 85 dBA threshold values, installation and benefits of new noise monitoring system, and flight track monitoring noise quarterly reports. See *Chapter 6, Noise Abatement.*
A.28	Ian A. Bowles. Secretary	Noise	The chapter should also report on noise abatement efforts and provide a status update on the new noise and operations monitoring system.	An update on noise abatement efforts and new noise and operations monitoring system can be found in *Chapter 6, Noise Abatement.*
A.29	Ian A. Bowles. Secretary	Air Quality	As part of the Section 61 findings for the centerfield taxiway component, the first phase of a two-phase Massport Air Quality Monitoring Study was initiated in September 2007 at ten locations on - and off-airport using both real time and time-integrated methods to measure fine particulates, volatile organic compounds (VOC), carbonyls, black carbon, and polynuclear aromatic hydrocarbons (PAHs)...Massport should consult with the Massachusetts Department of Environmental Protection (MassDEP), the City of Boston Environment Department and Boston Public Health Commission (BPHC) to discuss the second phase of the protocol.	Massport worked closely with regulatory agencies during study planning and subsequent first year of monitoring for the Logan Air Quality Monitoring Study. During the study planning phase, meetings were held to discuss the project scope, and address agency comments which were received from MassDEP and Massachusetts DPH. During the actual monitoring phase, quarterly meetings were held with MassDEP and DPH to review the progress of monitoring and the data collection processes. Massport anticipates continuing to work closely with MassDEP and DPH and welcomes the input from other agencies like the Boston Environment Department during the second year of monitoring. At the completion of the second year of monitoring, Massport is committed to complete a scientifically-based assessment of the collected data. The exact scope of the assessment will be worked out with the regulatory agencies while the second year of monitoring is being conducted beginning September 2010. Massport anticipates that work performed under this study will be reviewed by MassDEP and DPH, and other interested agencies. The Work Plan, which describes the monitoring program in detail, and monitoring data report from the first year can be found on Massport's website (http://www.massport.com/environment/environmental_reporting/Documents/aq_work_plan.pdf).

Comment #	Author	Topic	Comment	Response
A.30	Ian A. Bowles. Secretary	Air Quality	The 2009 EDR should continue updates on the information presented in the 2008 EDR and address comments received related to air quality. For 2009 Air Quality/Emissions Reductions chapter should include an overview of the environmental regulatory framework affecting aircraft emissions, changes in aircraft emissions, and the changes in air quality modeling.	The *2009 EDR* reports on modeled air quality using EDMS and MOBILE motor vehicle emissions models to model CO, NOx, VOCs, PM, NO_2 . In addition, Massport modeled NOx emissions by airline. Finally, Massport reported in Air Quality Initiative Tracking, Massport's and Tenants' Alternative Fuel Vehicle Programs; and the status of other Logan Airport air quality studies undertaken by others. See *Chapter 7, Air Quality.*
A.31	Ian A. Bowles. Secretary	Air Quality	The chapter should also discuss analysis methodologies and assumptions and report on 2009 conditions using the most recent version of the Emissions Dispersion Modeling System (EDMS) and MOBILE motor vehicle emissions.	*Chapter 7, Air Quality* reports on the model updates to EDMS and MOBILE and uses the most recent versions of the models to assess air quality conditions.
A.32	Ian A. Bowles. Secretary	Air Quality	The chapter should also include: emissions inventory for carbon monoxide (CO); emissions inventory for oxides of nitrogen (NOx); emissions inventory for volatile organic compounds (VOCs); emission inventory for particulate matter (PM); nitrogen dioxide (NO2) monitoring; and NOx emissions by airline.	*Chapter 7, Air Quality* of this 2009 EDR includes emissions inventories for CO, NOx, VOC, PM; NO2 monitoring, and NOx emissions by airline.
A.33	Ian A. Bowles. Secretary	Air Quality	This chapter should also report on the following air quality initiatives (AQI) for 2009: Air Quality Initiative Tracking; Massport's and Tenant's Alternative Fuel Vehicle Programs; and the status of other Logan Airport air quality studies undertaken by Massport or others.	*Chapter 7, Air Quality* of this *2009 EDR* reports on the status of the AQI for 2009.
A.34	Ian A. Bowles. Secretary	Air Quality	The air quality chapter should include an inventory of greenhouse gas (GHG) emissions from Logan Airport in 2009. GHG emissions should be quantified for aircraft, GSE, motor vehicles and stationary sources using emission factors and methodologies outlined in the Greenhouse Gas Emissions Policy and Protocol issued by EEA.	*Chapter 7, Air Quality* of this *2009 EDR* includes a report on GHG emissions at Logan Airport in 2009.
A.35	Ian A. Bowles. Secretary	Air Quality	The 2008 EDR indicates Massport commissioned a study to evaluate operational, economic and environmental benefits of cogeneration as a way to reduce air emissions associated with the Central Utility Plant. If cogeneration is found feasible, energy consumption could be reduced Airport-wide as could the emissions of criteria pollutants (i.e. CO, NOx, etc.) and GHGs. The status of this study is not described. Therefore, an update should be provided in the 2009 EDR.	The status and results of the congeneration study are described in *Chapter 7, Air Quality* of this *2009 EDR.*

Comment #	Author	Topic	Comment	Response
A.36	Ian A. Bowles. Secretary	Water Quality	For 2009, the Water Quality/Environmental Compliance and Management chapter should report on the 2009 status of: the National Pollutant Discharge Elimination System (NPDES) Permit and monitoring results for Logan Airport's outfalls and the Fire Training Facility; jet fuel usage and spills; Massachusetts Contingency Plan (MCP) activities; tank management; update on Environmental Management Plan; fuel spill prevention; future stormwater management improvements (if any); future MCP and tank management activities. Massport should continue to report in the 2009 EDR how Massport will assess, remediate, and bring to regulatory closure areas of subsurface contamination.	These water quality/environmental compliance activities are reported in *Chapter 8, Water Quality/ Environmental Compliance and Management*.
A.37	Ian A. Bowles. Secretary	Sustainability	This chapter describes Massport's continued efforts including Massport-wide sustainability and details how sustainability is incorporated into many aspects of Massport's activities: Planning and Design; Construction; Operations, Maintenance and Management; and Monitoring of Environmental Performance which are detailed in this chapter. The information in [Chapter 1] is very informative and I encourage Massport to continue with its updates in the 2009 EDR.	These sustainability efforts are reported in *Chapter 1, Introduction/Executive Summary.*
A.38	Ian A. Bowles. Secretary	Mitigation	[T]his chapter should report on the status of mitigation commitments for specific Massport and tenant projects at Logan Airport that have commenced construction. The mitigation commitments were made in the Section 61 findings for the following projects which should be reported: West Garage/Central Garage; International Gateway; Runway Ends 22R and 33L Safety Improvements; Replacement Terminal A; and Logan Airside Improvements Planning.	The status of these mitigation efforts is reported in *Chapter 9, Project Mitigation Tracking.*
A.39	Ian A. Bowles. Secretary	Mitigation	This chapter should also update the status of Massport's mitigation commitments and identify projects for which mitigation is complete.	The status of these mitigation efforts is reported in *Chapter 9, Project Mitigation Tracking.*
A.40	Ian A. Bowles. Secretary	MEPA	[T]he 2009 EDR must provide responses to the issues raised in comments received.	Individual responses to comments are provided in Appendices A and B of this *2009 EDR.*
A.41	Ian A. Bowles. Secretary	MEPA	The 2009 EDR must include a copy of this Certificate and a copy of each comment letter received on the 2008 EDR.	An annotated copy of the *2008 EDR* Certificate and each comment letter received on the *2008 EDR* are provided in this appendix of the *2009 EDR.*
A.42	Ian A. Bowles. Secretary	MEPA	In particular, Massport should provide a thorough examination of issues raised regarding individual noise monitoring locations, noise measurement and modeling, noise abatement, and air quality issues.	Noise and Air Quality issues are addressed in *Chapter 6, Noise Abatement* and *Chapter 7, Air Quality/Emissions Reduction* respectively.
A.43	Ian A. Bowles. Secretary	MEPA	Massport should consult directly with individual commenters where appropriate.	Massport has consulted with various commenters, as needed, to support preparation of these responses to comments on the *2008 EDR.*

Copies of Secretary of the Executive Office of Energy and Environmental Affairs Certificates issued for the Reporting Years 2004, 2005, 2006, and 2007

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2524

MITT ROMNEY
GOVERNOR
KERRY HEALEY
LIEUTENANT GOVERNOR
STEPHEN R. PRITCHARD
SECRETARY

Tel. (617) 626-1000
Fax. (617) 626-1181
http://www.mass.gov/envir

August 16, 2006

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL STATUS AND PLANNING REPORT

PROJECT NAME	: 2004 Logan Environmental Status and Planning Report
PROJECT MUNICIPALITY	: Boston / Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 3247
PROJECT PROPONENT	: Massachusetts Port Authority
DATE NOTICED IN MONITOR	: June 7, 2006

As Secretary of Environmental Affairs, I hereby determine that the Environmental Status and Planning Report submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00).

The environmental review process at Logan Airport has been structured to occur on two levels: airport-wide and project-specific. The Environmental Status and Planning Report (ESPR) has evolved from a largely retrospective status report on airport operations to a broader analysis that also provides a prospective assessment of long-range plans. It has thus become (consistent with the objectives of the MEPA regulations) part of Massachusetts Port Authority's (Massport) long range planning. The ESPR provides a "big picture" analysis of environmental impacts associated with current and anticipated levels of activities, and presents an overall mitigation strategy aimed at avoiding increases in such impacts. The ESPR analysis is supplemented by (and ultimately incorporates) the detailed analyses and mitigation commitments of project-specific EIRs. The ESPR is currently updated on a five-year basis, with much less detailed Environmental Data Reports filed in the years between submission of the ESPRs. The 2004 ESPR is the subject of this Certificate.

Background

In 1979, the Secretary of the Executive Office of Environmental Affairs (EOEA) issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the airport through a Generic Environmental Impact Report (GEIR). The Certificate also required the submission of interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR provided projections of environmental conditions

where the cumulative effects of individual projects could be understood. The Secretary's Certificate on the *1997 Annual Update* proposed a revised environmental review process for Logan Airport. As a result, Massport evaluates the cumulative impacts associated with airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs.

This 2004 ESPR was originally scheduled to be completed in 2005, but was postponed until 2006. The 2004 ESPR was delayed because of delays associated with the completion of the New England Regional Aviation System Plan (NERASP). Massport adopted the NERASP forecasts for its 2020 Logan Airport forecast of aviation activity in this ESPR, and upon which the analysis of 2020 environmental conditions is based. Postponing completion of the 2004 ESPR ensured that the forecasts used in the ESPR are the most current and accurate forecasts available.

Review of the 2004 ESPR

In general, the ESPR has responded to the scope. In particular, the ESPR contains a wealth of useful data on activity levels and impacts, and lays out a forecast for trends in the future years. The technical studies in the 2004 ESPR included reporting on and analysis of key indicators of airport activity levels, the regional transportation system, ground access, noise, air quality, environmental management, and project mitigation tracking.

As always, EOEA remains committed to evaluating and addressing the cumulative impacts of airport operations on the nearby communities. In June 2001, Massport agreed to work with EOEA on structuring a proposed Air Quality Initiative (AQI). The Certificate indicated that Massport was "to solicit project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM." This Certificate on the ESPR reiterates that Massport has committed to the Air Quality Initiative, a key program designed to mitigate the cumulative air quality impacts of airport operations. The 2005 EDR should detail how Massport is meeting this commitment. The 2005 EDR must also address all of the air quality issues raised by the commenters.

Although Massport has presented a detailed ESPR, I remain concerned with a number of environmental issues, specifically air quality and noise related issues, as outlined below.

Follow-up

Massport should submit the next EDR (analyzing conditions for the 2005 calendar year no later than December 15, 2006. I recognize that this Certificate requires the inclusion of considerable follow-up in that document. However, ESPRs invariably raise important issues which require follow-up sooner rather than later, and this ESPR is no exception. I anticipate that the EDR in a year following the publication of an ESPR will always have to include such analytical follow-up to the ESPR and respond to comments on the ESPR. Other EDRs should provide more of a

"snapshot" of the previous year's operations and impacts, with more substantial analysis awaiting the next GEIR. EDRs in years other than the year immediately following publication of an ESPR should therefore be considerably less voluminous and Massport should strive to submit these documents by July 31 of the year following the subject year.

Responses to Comments

The next EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments included in this ESPR is well-constructed and cross-referenced (although several comments have complained of general responses or document references in response to specific questions). Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity, where necessary.

The majority of comments received on the EDR focused on air quality and noise related issues, including measurement of noise, modeling of noise contours, and noise abatement. In addition to responding to these comments, the 2005 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts.

Airport Activity Levels

The ESPR included a chapter on airport activity levels, including information on aircraft operations, fleet mix, passenger activity levels, and cargo and mail operations. This chapter also reported on Massport's forecasts that will become the basis for Massport's strategic planning initiatives over the next few years. Past forecasts were based on low, medium, and high passenger activity levels. New forecasts are now based on the forecasts for 2020 developed for the New England Regional Airport System Plan (NERASP) study. This chapter included aircraft operations and passenger activity forecasts, and provided a discussion of methodologies and assumptions, including anticipated fleet mix changes and other trends in the aviation industry.

Air passenger traffic at Logan Airport continued to rebound in 2004, but remained below the peak year level reached in 2000. The total number of passengers using Logan Airport in 2004 increased by 14.7 percent over 2003 levels to 26.1 million passengers. Although the recovery in passenger demand was underway in 2004 at Logan Airport and throughout the industry, legacy commercial airlines continued to struggle financially as competition from low cost carrier (LCC) rivals increased and fuel prices remained high.

For the first time since 1998, total annual aircraft operations (arrivals and departures) at Logan Airport increased compared to the previous year and were at their highest level since 2001. Daily operations in 2004 averaged approximately 1,107 compared to approximately 1,027 in 2003, an increase of about 80 operations per day or about 8.6 percent. 2004 levels remain below historic peaks. The growth in aircraft activity was driven primarily by the entry and expansion of LCCs at Logan Airport in 2004. This increase in LCC services in 2004 stimulated growth in airport

passenger demand.

In 2004, Logan Airport ranked 19th among US airports in total cargo volume. All-cargo operations at Logan Airport declined by less than 1 percent in 2004. However, total cargo volume, including cargo carried in the belly compartments of passenger aircraft, rose by 0.6 percent.

Airport Planning

This section described the status of planning initiatives and projects through the planning horizon year (2020) for the Terminal Area; Airside Area; Service and Cargo Areas; and Edge Buffers and Landscaping. The Airport Planning Chapter also reported on the status of public works projects implemented by other agencies within the boundaries of Logan Airport.

Several projects were completed in 2004:

- The majority of construction of the main terminal and satellite concourse of Delta Air Lines' Replacement Terminal A Project was completed in 2004.
- A dedicated hourly parking area opened on the lower level of the Terminal B Garage in July 2004.
- Massport also launched Exit Express, Massport's convenient way to pay for parking.
- The Massachusetts Bay Transportation Authority's (MBTA's) $23 million new Blue Line Airport Station opened in June 2004.
- Demolition of the old MBTA Airport Station was completed in 2004.
- By the end of 2004, completion of the Central Artery/Tunnel (CA/T) Project and improvements to the roadway system were complete, allowing for a more efficient roadway network with shorter and more direct routes between destinations in the airport and the regional highway system.
- The Silver Line, the most recent addition to the transit system and Boston's first Bus Rapid Transit line, began limited service to Logan Airport in December 2004.

Both Massport and Logan Airport's tenants are proposing projects or exploring planning options to modernize and carry out future improvements at Logan Airport. Massport's planning criteria for Logan Modernization are based on accommodating 45 million annual passengers in airport terminals, facilities, and on airport roadways. Future projects and planning concepts include:

- Both Massport and Logan Airport's tenants are proposing projects or exploring planning options to modernize and carry out future improvements to the existing terminal facilities. Some projects and planning concepts include ongoing expansion and upgrade of Terminal E and constructing a new satellite Federal Inspectional Services (FIS) Facility at the southeast end of Terminal B.
- Some projects and planning concepts that are underway or under consideration include, consolidating flight kitchen facilities in the north service area, constructing new multi tenant maintenance facilities for ground service equipment (GSE), and constructing new

hangar facilities in the north cargo area.

- Airside improvements include upgrades and improvements to the airfield to enhance the operations efficiency and safety of Logan Airport. Some projects and planning concepts that are underway or under consideration include, installing a security wall along the perimeter of the air operations area, providing additional aircraft parking for certain types of aircraft, and an airside improvements planning project to reduce current and projected levels of aircraft delay.
- Buffer areas are being designed in consultation with Logan Airport's neighbors and other interested parties in an open community planning process. Some future airport buffer projects and planning concepts include, landscaping the former Navy Fuel Pier at Jefferies Point, installing a landscaped border in conjunction with the north service area Economy Parking Lot construction, and constructing a half-acre linear area with landscaping and lighting improvements along Maverick Street.
- Massport is considering a parking strategy to address future on-airport parking demands. Some ongoing and future parking projects and planning concepts include redeveloping three parcels into a combined economy parking facility with the capacity for up to 1,750 vehicles, proposed parking facility in the Southwest Service Area, and a new consolidated facility for all car rental operations

Regional Transportation Context

Overall, aviation activity levels at New England's regional airports increased in 2004, as passenger demand continued to rebound both within the region and nationally after the 2001 downturn. Just as the passenger decline seen at the regional airports in the wake of September 11, 2001 was less severe than the declines experienced at Logan Airport, the traffic recovery seen at the regional airports in 2004 was not as strong as the rebound experienced at Logan Airport. Growth at Logan Airport was largely fueled by a growing presence of LCC services. At the same time, regional airports continued to experience growth in 2004 and served a significant (42.5 percent) share of the region's air passenger traffic. Several factors have contributed to the success of the regional airports in recent years:

- Many of the regional airports benefited from the introduction and growth of LCC services over the past several years. This trend began when Southwest Airlines entered the New England market in 1996 by serving T.F. Green Airport in Warwick, Rhode Island and later expanding into the Manchester and Hartford/Bradley International Airports. The trend continued in 2004 when Spirit Airlines began service from T.F. Green Airport, Independence Air5 initiated low-fare service at several of the regional airports, and Southwest Airlines continued to increase service from its New England airports.
- Several of the smaller airports, particularly Burlington, Bangor, and Tweed-New Haven continued to benefit from the introduction of regional jets and gained new non-stop services to airline connecting hubs, which increase service options for regional airport passengers.

Ground Transportation

The chapter reported on 2004 conditions and provided a comparison of 2004 findings to previous years for variety of ground transportation indicators. The chapter also presented a discussion of analysis methodologies and assumptions for future year conditions for the planning horizon year 2020 for Traffic volumes, On-airport Vehicle miles traveled (VMT) and Parking demand.

- Completion of the CA/T and Logan Airport Modernization projects created a more efficient roadway network with shorter and more direct routes to destinations within Logan Airport.
- With the exception of water transportation, all scheduled and unscheduled high occupancy vehicle (HOV) transportation to Logan Airport saw increased ridership in 2004.
- Overall HOV mode share for air passengers increased from 25.8 percent in 1990 to 32 percent in 2003. Although the data shows a slight decrease to 30.3 percent in HOV modes in 2004, the 2003 HOV mode share was an all-time high, reflecting Massport's success in generally maintaining or increasing the percentage of passengers using HOV modes in all market segments.
- The most recent employee survey showed an employee HOV mode share of 26.8 percent.
- Airport-related average annual daily traffic (ADDT) volumes increased by 12.6 percent in 2004 over 2003 volumes. Despite this increase in ADDT volumes, the vehicle miles traveled (VMT) on Logan Airport's roadway system only increased by 3.5 percent in 2004 compared with the 2003 VMT. This reflects the effects of the changes in the airport roadway system resulting from the CA/T and Logan Airport Modernization projects, which result in a shorter average trip length, creating a much smaller increase in total VMT than in average weekday daily traffic volumes.
- Massport executed a Memorandum of Understanding with the MBTA to commence Silver Line bus rapid transit service in late 2004. Massport's support of the Silver Line Airport service will total more than $30 million over ten years.

Between 2003 and 2004, membership in the Transportation Management Association (TMA) declined by 800 employees, a 13.3% reduction. Massport stated in the ESPR that significant TMA funds had been expended for administrative functions resulting in underfunded programming. The Executive Office of Transportation's MassRIDES program will now provide a TMA coordinator at state expense. The EOT identified its expectation that Massport will "maintain its current level of effort, including both cash contributions and in-kind services.

The Secretary's June 15, 2001 Certificate on the AIPP directs Massport to require that all Logan employers join the TMA at the earliest possible opportunity. This mitigation measure is not listed in Table 10-7 and no plan is presented for meeting this requirement. A plan should be detailed in the 2005 EDR.

The ESPR indicated that two FAA programs had relocated to New Hampshire in 2004 and that Beacon-Skanska, having completed the construction of Terminal A, was no longer at Logan. Four additional corporate members left the TMA in 2004. The 2005 EDR should provide explanation for this.

The 2003 EDR stated that TMA shuttle ridership declined by 32.4 percent due to the elimination of services at mid-year due to lack of funding., but that the decrease in shuttle ridership had been more than off-set by increased Logan Express use. Massport should identify any efforts such as more active marketing of car/ridesharing options targeted to those who previously used the cancelled shuttles. This information should be provided in the 2005 EDR.

Noise

This chapter began with an overview of the environmental regulatory framework affecting aircraft noise, the changes in aircraft noise, the methodologies used to track noise, and what if any changes there was in noise modeling. The information in this chapter built upon the findings of the Boston Logan Overflight Noise Study. This chapter also updates the status Massport's efforts to reduce noise levels and provides noise contours population counts for 2020.

- Massport has continued to make improvements in the noise modeling process as the sophistication of noise models and data acquisition systems has advanced. Recent developments in noise modeling technologies and techniques employed in this 2004 ESPR and to be used in future years include: use of a new radar data acquisition system, known as a long-range PASSUR, for the source of all radar-based operations data; a new upgrade to Massport's radar data processing software; use of the latest update to the FAA's Integrated Noise Model, while retaining the unique capability to account for over-water sound propagation and hill effects unique to Logan Airport; incorporation of more than 1,800 modeled flight tracks, checked and updated where necessary to reflect 2004 radar data; use of radar data to determine the "best-fit" match among each of the nearly 402,000 radar traces captured by Logan Airport's noise monitoring system and the available climb profile contained within the INM database; procurement of an improved noise and operations monitoring system; procurement of automated altitude profile and noise contour generation software.
- From May to August 2004, Runway 4L-22R was closed either completely or partially to accommodate repaving. Due to this closure, jet aircraft departures on Runway 22R decreased by approximately 23 percent compared to 20036 while departures on other runways increased.
- As a result of changes in airport operations in 2004, the number of people exposed to Day-Night Sound Level (DNL) values greater than 65 dB increased compared to the number in 2003. An estimated 10,720 people were exposed to DNL levels greater than 65 dB in 2004, compared to 7,183 in 2003, and 8,309 in 2002. The majority of the increase occurred in East Boston off the northwest end of Runway 33L. The increases within the

65dB are in areas that were previously sound insulated. Despite these increases, the total count of people exposed to 65 dB DNL and above was 23 percent lower than in 2001.

- The 2004 Cumulative Noise Index (CNI) of 153.4 Effective Perceived Noise Level (EPNdB) remained well below the cap of 156.5 EPNdB. Although CNI also increased compared to 2003 and 2002 as a result of the increased number of operations, the 2004 level remained below the 2001 CNI value.

- The number of residential dwelling units for which Massport provided sound insulation in 2004 was 791. Since the program's inception, the total number of dwelling units receiving sound insulation is now 8,615. In addition, Massport completed sound insulation of a 36th school – the new Center School located in Winthrop.

The Logan Airport Noise Study is now expected to be conducted in at least three phases. I strongly encourage Massport to include a phase for the monitoring and assessment of altered flight paths so that any necessary modifications can be identified and implemented.

In addition, the ESPR indicated that there will be an increase from 2004 to 2020 in the number of Boston residents who will experience noise in the 70-75 DNL and the 75-80 DNL due to the use of parallel runways. Massport strive to identify ways to ensure that these increases do not occur. The 2005 EDR should include a preliminary discussion about how Massport will address projected exceedances.

Air Quality

This chapter presented an overview of the environmental regulatory framework affecting aircraft emissions, changes in aircraft emissions, and the changes in air quality modeling. It also predicts emission levels for 2020.

- To ensure consistency and comparability between 1999 and 2004 air quality emissions, the 1999 air emissions inventory was updated with information that was not available when first reported and 1999 emissions were recalculated using the new version of the FAA's Emissions and Dispersion Modeling System (EDMS) v4.21. Additional data were also added to the 2004 inventory in order to increase the accuracy of the results, for example curbside queue times were updated and new parking areas were added to the inventory.

- In 2004, the emission inventory results were driven by an 8 percent increase in aircraft operations compared to 2003 activity levels. Increases in stationary source (fuel storage facilities, heating plant, etc.) emissions further contributed to the increase in levels of volatile organic compounds (VOCs) and oxides of nitrogen (NOx).
- In 2004, total VOC emissions at Logan Airport were estimated to be approximately 1,360

kilograms (kg)/day, which is an increase of 17 percent from 2003 levels. However, total VOC emissions at Logan Airport were 41 percent lower in 2004 than in 1999. The increase of VOC emissions between 2003 and 2004 was due to the increase in aircraft operations in 2004.

- In 2004, total NOx emissions from all airport-related sources were estimated to be 4,290 kg/day, which is an increase of 16 percent from 2003 levels, but is a 26 percent decrease as compared to 1999 levels. Once again, the increase in aircraft operations contributed the most to this increase in airport-related NOx in 2004.

- Total carbon monoxide (CO) emissions at Logan Airport in 2004 were estimated to be 9,852 kg/day, or 3 percent below 2003 levels. In 2004, total CO emissions at Logan Airport were 32 percent lower than 1999 levels. While CO emissions from aircraft increased due to increased aircraft operations, the use of alternative fuel vehicles (AFVs) and the lower emission rates of the motor vehicle fleet helped to reduce the overall CO emissions in 2004. Massport added three new AFVs to its fleet in 2004.

- Massport developed an Air Quality Initiative (AQI) in 2001 as a long-range program with the overall goal to maintain NOx emissions associated with Logan Airport at or below the 1999 level of 2,347 tpy. In 2004, NOx emissions from all airport-related sources were estimated to be 1,726 tpy, well below the 1999 level.

Through the June 15, 2001 Certificate of the Secretary of EOEA on the FEIR for the AIPP, Massport was directed to develop a program to maximize the use of single-engine taxiing procedures by all of its tenant airlines. Massport must describe in the 2005 EDR how it presently encourages reduced-engine (single-engine) taxiing. The cited issues of safety and practicality should be discussed and the program that will be implemented as noted in Table 10-7of the 2005 ESPR should be outlined.

Massport was also directed in the same Certificate to conduct follow-up air quality monitoring in neighborhoods surrounding the airport and surrounding flight paths. This mitigation measure does not appear in Table 10-7, "Logan Airside Improvements Planning Project, Details of Ongoing Section 61 Mitigation Measures." The 2005 EDR should address this measure in detail.

Table 7-13 of the 2004 ESPR , "Inventory of Tracking of NOx Emissions in tons per year for Logan Airport," contains numbers that have been "adjusted to reflect know reductions achieved by Massport and its tenants at Logan Airport." The 2005 EDR should include unadjusted numbers and detailed information about the means for achieving reductions and the emissions value of each reduction method.

Massport had agreed to work with EOEA on structuring a proposed Air Quality Initiative (AQI) in the June 2001 Certificate for the AIPP. The Certificate indicated that Massport was "to solicit

project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM." There is no information in the ESPR about the substance and status of any process with EOEA or about the solicitation of information and objective, neutral, scientific review. The 2005 EDR should address this matter in detail.

Environmental Management/Water Quality/Environmental Compliance

This chapter reported on the activities of Massport's Environmental Management Unit in meeting the state's environmental regulatory requirements.

- In 2004, of the 126 spills reported to the Logan Airport Fire-Rescue Department, 18 spills (14 percent) were ten gallons or greater in quantity. Jet fuel spills accounted for 82 (65 percent) of the total spills, with 12 spills (15 percent) being ten gallons or greater in quantity. The remaining 44 spills involved gasoline, hydraulic oil, diesel fuel, ethylene glycol, propylene glycol, paint, and AVGAS. Of these spills, 6 (14 percent) were ten gallons or greater. Since 2002 there has been a reduction in the total volume of all spills.

- In accordance with the Massachusetts Contingency Plan (MCP), Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination.

Massport indicates that it has had limited success in identifying the causes of exceedances due to "first flush" pollutants in stormwater, the number of potential sources at Logan, and the size of drainage areas serving outfalls. Massport needs to develop a plan for maximizing its ability to identify causes. This plan should be identified in the 2005 EDR. Massport should also include in the 2005 EDR copies of any new NPDES stormwater and fire training permits.

Sustainability Initiatives

This Chapter presented Massport's on-going and upcoming sustainability initiatives at Logan Airport. Massport continues to demonstrate forward thinking in sustainability policies and practices for transportation agencies. I encourage Massport to require tenant participation and compliance with all elements of the plan as leases are renewed.

As I stated at the beginning of this Certificate, the 2005 EDR must provide responses to the issues raised in comments received. The 2005 EDR must include a copy of this Certificate and a copy of each comment letter received on the 2004 ESPR. In particular, Massport should provide a thorough examination of issues raised regarding individual noise monitoring locations, noise measurement and modeling, and noise abatement. Massport should consult directly with individual commentors where necessary.

A distribution list for the 2005 EDR (indicating those receiving documents, CDs, or Notices of

Availability) should be provided in the document. This section must also include copies of all GEIR/Annual Update Certificates issued since 1995 to provide context for reviewers. Supporting technical appendices should be provided as necessary.

August 16, 2006
Date

Robert W. Golledge, Jr.

Comments received:

07/25/06	Stephen Kaiser
08/08/06	Nancy Timmerman
08/09/06	MA Executive Office of Health and Human Services
08/09/06	John Vitagliano
08/09/06	Bruce Egan, Egan Environmental
08/10/06	City of Boston Environment Department
08/14/06	Boston Transportation Department

RWG/ACC/acc

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

February 15, 2007

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
2005 LOGAN AIRPORT ENVIRONMENTAL DATA REPORT

PROJECT NAME	: 2005 Environmental Data Report
PROJECT MUNICIPALITY	: Boston / Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 3247
PROJECT PROPONENT	: Massachusetts Port Authority
DATE NOTICED IN MONITOR	: December 23, 2006

As Secretary of Environmental Affairs, I hereby determine that the Environmental Data Report submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00).

The environmental review process at Logan Airport has been structured to occur on two levels: airport-wide and project-specific. The Environmental Status and Planning Report (ESPR) has evolved from a largely retrospective status report on airport operations to a broader analysis that also provides a prospective assessment of long-range plans. It has thus become (consistent with the objectives of the MEPA regulations) part of Massachusetts Port Authority's (Massport) long range planning. The ESPR provides a "big picture" analysis of environmental impacts associated with current and anticipated levels of activities, and presents an overall mitigation strategy aimed at avoiding increases in such impacts. The ESPR analysis is supplemented by (and ultimately incorporates) the detailed analyses and mitigation commitments of project-specific EIRs. The ESPR is currently updated on a five-year basis, with much less detailed Environmental Data Reports (EDR) filed in the years between submission of the ESPRs. The 2005 EDR is the subject of this Certificate.

Background

In 1979, the Secretary of the Executive Office of Environmental Affairs (EOEA) issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the airport through a Generic Environmental Impact Report (GEIR). The Certificate also required the submission of interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR provided projections of environmental conditions where the cumulative effects of individual projects could be understood. The Secretary's Certificate on the *1997 Annual Update* proposed a revised environmental review process for Logan Airport. As a result, Massport evaluates the cumulative impacts associated with airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs.

Review of the 2005 EDR

In general, the EDR has fulfilled its purpose of providing a "snapshot" of year 2005 passenger and impact levels at Logan Airport. Most environmental parameters showed significant improvement in calendar year 2005. In particular, the technical studies in the 2005 EDR included reporting on and analysis of key indicators of airport activity levels, airport planning, the regional transportation system, ground access, noise, air quality, environmental management, and project mitigation tracking.

As always, EOEA remains committed to evaluating and addressing the cumulative impacts of airport operations on the nearby communities. In June 2001, Massport agreed to work with EOEA on structuring a proposed Air Quality Initiative (AQI). The Certificate indicated that Massport was "to solicit project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM." The 2005 EDR reiterates that Massport has committed to the Air Quality Initiative, a key program designed to mitigate the cumulative air quality impacts of airport operations. The 2005 EDR details how Massport is meeting this commitment. The 2006 EDR should continue to report on the details of Massport's committment. In addition to the environmental issues listed below, the 2006 EDR should address all of the air quality and noise related issues raised by the commenters during the review of the 2005 EDR.

Follow-up

Massport should file the next EDR (covering operations for the 2006 calendar year) in calendar year 2007. The EDR should provide more of a "snapshot" of the 2006 operations and impacts, with more substantial analysis awaiting the next GEIR. Massport should also address the comments received on the current EDR when developing its 2006 EDR.

Responses to Comments

The next EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments

included in this EDR is well-constructed and cross-referenced. Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity, where necessary.

The majority of comments received on the 2005 EDR focused on air quality and noise related issues, including measurement of noise, modeling of noise contours, and noise abatement. In addition to responding to these comments, the 2006 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts.

Activity Levels

The Activity Levels chapter presents aviation activity statistics for Logan Airport in 2005 and compares activity levels to the prior year including air passengers, aircraft operations, fleet mix, and cargo/mail volumes. Air passenger traffic at Logan Airport continued to rebound in 2005, but remained below the peak year level reached in 2000. Specifically, the total number of passengers using Logan Airport in 2005 increased by 3.6 percent over the prior year to 27.1 million passengers. In 2005, total aircraft operations (409,066 operations) at Logan Airport increased by 0.9 percent over 2004 levels. While 2005 passenger traffic at Logan Airport was approximately equal to 1999 levels, in 2005 these passengers were being carried on approximately 86,000 fewer flights (495,000 flights in 1999 versus 409,066 flights in 2005). Several commenters raised concerns with the increase in passenger levels requesting long-term solutions to meeting demand which do not include expansion of Logan Airport's capacity or footprint. I advise Massport to consider and attempt to address these comments in the next 20006 EDR.

Planning

The Airport Planning chapter provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2005. It also describes known future planning, construction, and permitting activities. Specifically, several projects were completed in 2005 including the majority of construction of the main terminal and satellite concourse of Delta Air Lines' Replacement. Terminal A Project was completed in 2004, with final fit up and commissioning in 2005. Massport also launched Exit Express as part of an on-going program to improve parking facilities and improve air quality through enhanced circulation and reduced idling at the toll booths. In addition, as part of a cooperative venture between the Massachusetts Bay Transportation Authority (MBTA) and Massport, initial Silver Line service to the airport began in December 2004. Full Silver Line service to Logan Airport began on June 1, 2005.

The chapter also includes future planning including: ongoing expansion and upgrade of Terminal E and completion of West Garage Phase II(Central Garage Expansion); more efficient ways of using the limited land resources in the service areas; airside improvements include upgrades and improvements to the airfield to enhance the operations, efficiency and safety of Logan Airport; In addition, buffer areas are being designed in consultation with Logan Airport's neighbors and other interested parties in a community planning process. Massport is also considering a parking strategy to address future on-airport parking demands. Some ongoing and future parking projects and planning concepts include redeveloping three parcels into a combined economy parking

facility with the capacity for up to 1,750 vehicles and a new consolidated facility for all car rental operations.

Regional Transportation

This chapter describes activity levels at New England's regional airports in 2005 and updates recent planning activities. Overall, the number of air passengers utilizing New England's primary commercial service airports in 2005 rose by 5.3 percent over 2004. When measured by aircraft operations, however, activity levels fell by 0.6 percent. This reflects sweeping changes in both the commercial aviation and general aviation (GA) sectors of the industry. Passenger numbers rose despite capacity reductions as airlines operated at higher load factors. Carriers flew fewer flights to the regional airports than in 2004, but used larger aircraft on average in 2005, and carried more passengers. GA operations at New England airports declined by 3.8 percent from the 2004 levels. The Boston Transportation Department has raised a number of suggestions related to the Regional Transportation that Massport should consider in the 2006 EDR.

Ground Transportation

This chapter reports on transit ridership, roadways, traffic volumes, and parking for 2005. Specifically, ground transportation activity levels increased from 2004 to 2005 as a result of a 3.6 percent increase in the number of air passengers. In addition, traffic volumes on airport roadways increased by 5.8 percent, while the vehicle miles traveled (VMT) on the airport increased by 4.2 percent. The lower VMT growth when compared to overall traffic volume growth suggests that more direct connections over shorter roadway distances are provided. The facilities at the MBTA Blue Line Airport Station were also substantially improved in 2005, including the conversion from a manual to an automated fare collection system. In addition, full MBTA Silver Line service to Logan Airport began on June 1, 2005. In 2005, Terminal A and its associated access roadways were fully opened for operation. There were no other roadway modifications completed in 2005. In addition, contract negotiations began between Massport and the C & J Bus Company in New Hampshire to expand early morning transportation between New Hampshire and Logan Airport. This service began in 2006. Massport also re-bid its Logan Airport Transportation Management Association (Logan TMA) contract with the Executive Office of Transportation (EOT) through the MassRIDES program.

Noise

The Noise Abatement chapter updates the status of the noise environment at Logan Airport in 2005, and describes Massport's efforts to reduce noise levels. In 2005, the number of people exposed to Day-Night Sound Level (DNL) values greater than 65 decibels (dB) decreased compared to 2004. An estimated 6,477 people were exposed to DNL levels greater than 65 dB in 2005, compared to 9,438 in 2004, and 7,183 in 2003. The total count of people exposed to 65 dB Day-Night Sound Level (DNL) and above was 55 percent lower than in 2001. Winthrop, which has always experienced the highest levels of noise exposure of any community around Logan Airport, continued its decline in the number of people exposed to levels greater than 65 DNL. This number has dropped 81 percent since reaching its peak in 1998. The number of residents

exposed to noise over 75 DNL increased from 2004 but still remained below 2001 levels.

The 2005 Cumulative Noise Index (CNI) of 153.2 Effective Perceived Noise Level (EPNdB) remained well below the cap of 156.5 EPNdB. The CNI decreased slightly compared to 2004 even with a slight increase in the number of operations in 2005. This decrease is primarily due to decreased use of recertified aircraft by cargo operators. Massport provided sound insulation for 471 residential dwelling units in 2005. Since the program's inception, Massport has sound insulated a total of 9,086 dwelling units. The majority of the units insulated in 2005 were in Winthrop.

The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2006 EDR. I also strongly advise Massport to consider and address the numerous comments received that have raised noise related concerns in comments.

Air Quality

The Air Quality/Emissions Reduction chapter provides an overview of airport-related air quality issues in 2005 and efforts to reduce emissions. The 2005 emissions inventory results are driven by the small increase in aircraft operations at Logan Airport compared to 2004 levels. Compared to 2004 levels, total emissions of volatile organic compounds (VOCs) are estimated to have decreased by approximately 6 percent to 1,285 kilograms per day (kg/day). In 2005, total emissions of oxides of nitrogen (NOx) were estimated to be 4,187 kg/day, which is a 2 percent decrease from 2004 levels. Total emissions of carbon monoxide (CO) in 2005 were 9,556 kg/day, or 3 percent lower than 2004 levels.

For the first time, estimates of particulate matter emissions associated with Logan Airport are reported in this 2005 EDR in response to the recent availability of an FAA-approved method for computing particulate matter emission factors for aircraft. Total emissions of particulate matter (PM2.5) at Logan Airport in 2005 were approximately 83 kg/day [33 tons/year (tpy)]. NOx emissions at Logan Airport in 2005 were approximately 662 tpy lower than 1999 levels—a 28 percent decrease. It appears that there is an ongoing trend of decreasing nitrogen dioxide (NO2) concentrations at both the Massport and Massachusetts Department of Environmental Protection (MassDEP) monitoring sites located in the general vicinity of Logan Airport. In addition, annual NO2 concentrations at all monitoring locations were well below the NO2 air quality standards in 2005. The 2006 EDR should continue updates on the information presented in the 2005 EDR.

Water Quality/Environmental Compliance

This chapter describes Massport's ongoing environmental management activities including NPDES compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan, and tank management. Specifically, of the 97 spills reported in 2005, 15 (15 percent) were ten gallons or greater in quantity. Jet fuel spills accounted for 66 (68 percent) of the total spills, 12 of the jet fuel spills (18 percent) were ten gallons or greater in quantity. The remaining 31 spills involved gasoline, hydraulic oil, diesel fuel, and other substances. Of these spills, only

three (10 percent) were ten gallons or greater. In 2005, only eight samples exceeded the regulatory limits. The North Outfall had two samples which exceeded the 15 milligrams per liter (mg/L) National Pollutant Discharge Elimination System (NPDES) limit for oil and grease, and the Porter Street Outfall had one sample exceed this limit. The North Outfall had two samples which exceeded the 0.3 milliliters per liter (ml/L) daily maximum limit for settable solids, and the West Outfall had three samples exceed this limit. No other exceedances occurred. In accordance with the Massachusetts Contingency Plan (MCP), Massport should continue to report in the 2006 EDR how Massport will assess, remediate, and bring to regulatory closure areas of subsurface contamination.

Sustainability at Logan Airport

This chapter describes Massport's airport wide sustainability goals. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable design principles. In October 2004, the Massport Sustainability Team produced the *Massachusetts Port Authority Sustainability Plan* (Sustainability Plan). The Environmental Management Policy is incorporated in the Sustainability Plan as Massport's long-term sustainability goal or vision. This chapter describes Massport's continued efforts.

As I stated at the beginning of this Certificate, the 2006 EDR must provide responses to the issues raised in comments received. The 2006 EDR must include a copy of this Certificate and a copy of each comment letter received on the 2005 EDR. In particular, Massport should provide a thorough examination of issues raised regarding individual noise monitoring locations, noise measurement and modeling, and noise abatement. Massport should consult directly with individual commentors where necessary.

A distribution list for the 2006 EDR (indicating those receiving documents, CDs, or Notices of Availability) should be provided in the document. This section must also include copies of all GEIR/Annual Update Certificates issued since 1995 to provide context for reviewers. Supporting technical appendices should be provided as necessary.

February 15, 2007
Date

Ian A. Bowles

Comments Received:

01/30/07	State Representative Robert A. DeLeo
01/31/07	Joseph Felzani
02/05/07	Boston Transportation Department
02/06/07	Nancy Timmerman
02/07/07	Stephen Kaiser
02/13/07	City of Boston Environment Department

IAB/ACC/acc

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

November 1, 2007

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
2006 LOGAN AIRPORT ENVIRONMENTAL DATA REPORT

PROJECT NAME	: 2006 Environmental Data Report
PROJECT MUNICIPALITY	: Boston / Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 3247
PROJECT PROPONENT	: Massachusetts Port Authority
DATE NOTICED IN MONITOR	: September 25, 2007

As Secretary of Executive Office of Energy and Environmental Affairs (EEA), I hereby determine that the Environmental Data Report submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00).

The environmental review process at Logan Airport has been structured to occur on two levels: airport-wide and project-specific. The Environmental Status and Planning Report (ESPR) has evolved from a largely retrospective status report on airport operations to a broader analysis that also provides a prospective assessment of long range plans. It has thus become (consistent with the objectives of the MEPA regulations) part of Massport's long range planning. In recognition of the increased role of planning in the GEIR process, the name of the document was changed to ESPR. The ESPR provides a "big picture" analysis of environmental impacts associated with current and anticipated levels of activities, and presents an overall mitigation strategy aimed at avoiding increases in such impacts. The ESPR analysis is supplemented by (and ultimately incorporates) the detailed analyses and mitigation commitments of project-specific EIRs. The ESPR is currently updated on a 5-year basis, with much less detailed Environmental Data

Reports (formerly Annual Updates) filed in the years between ESPRs. The 2006 EDR is the subject of this Certificate.

In general, the EDR has fulfilled its purpose of providing a "snapshot" of year 2006 passenger and impact levels at Logan Airport. Most environmental parameters showed improvement in calendar year 2006. In particular, the technical studies in the 2006 EDR included reporting on and analysis of key indicators of airport activity levels, airport planning, the regional transportation system, ground access, noise, air quality, environmental management, and project mitigation tracking. Mitigation of noise impacts and air quality remain key concerns both of this office and the commenters. These commitments take the form of project-specific Section 61 Findings, as well as more general mitigation that has emerged from the ESPR process.

Background

In 1979, the Secretary of the Executive Office of Environmental Affairs issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the airport through a Generic Environmental Impact Report (GEIR). The Certificate also required the submission of interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR provided projections of environmental conditions where the cumulative effects of individual projects could be understood. The Secretary's Certificate on the *1997 Annual Update* proposed a revised environmental review process for Logan Airport. As a result, Massport evaluates the cumulative impacts associated with airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs.

Review of the 2006 EDR

As always, EEA remains committed to evaluating and addressing the cumulative impacts of airport operations on the nearby communities. In June 2001, Massport agreed to work with EEA on structuring a proposed Air Quality Initiative (AQI). The Certificate indicated that Massport was "to solicit project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM." The 2006 EDR reiterates that Massport has committed to the Air Quality Initiative, a key program designed to mitigate the cumulative air quality impacts of airport operations. The 2006 EDR details how Massport is meeting this commitment. The 2007 EDR should continue to report on the details of Massport's commitment and address the concerns raised by the City of Boston's Environment Department on this issue. In addition to the environmental issues listed below, the 2007 EDR should address all of the air quality and noise related issues raised by the commenters during the review of the 2006 EDR.

Procedural

Given the overall strength of the analysis in the 2006 EDR, the 2007 EDR can restrict itself to providing an update on 2007 conditions, and respond to those issues explicitly noted in this

Certificate and the comments received as requiring response in the next EDR. The EDR should provide a "snapshot" of the 2007 operations and impacts, with more substantial analysis awaiting the next ESPR. Massport should file the 2007 EDR no later than October 15, 2008 (although I encourage Massport to file sooner, given the relatively few requirements for the next EDR).

A distribution list for the 2007 EDR (indicating those receiving documents, CDs, or Notices of Availability) should be provided in the document. This section must also include copies of all ESPR and EDR Certificates issued since the 2004 Logan Environmental Status and Planning Report (issued on August 16, 2006) to provide context for reviewers. Supporting technical appendices should be provided as necessary.

Responses to Comments

The comments received on the 2006 EDR are thoughtful and detailed although I note that some of the comments were received only one day before this Certificate was to be issued. I request that during the review of the 2007 EDR that commenters make every attempt to submit comments by the close of the comment period to allow time for review. The 2007 EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments included in this EDR is well-constructed and cross-referenced. Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity, where necessary.

The majority of comments received on the 2006 EDR focused on air quality and noise related issues, including measurement of noise, modeling of noise contours, and noise abatement. In addition to responding to these comments, the 2007 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts. Massport should consult directly with individual commentors where necessary.

Organization of the Certificate

I have organized the remainder of this Certificate to respond to issues raised roughly in the order in which they were presented in the 2006 EDR, although I have for the most part incorporated discussion of issues raised in the technical appendix into the discussion of the environmental impact analyses.

Activity Levels

The Activity Levels chapter provides a solid analysis of major activity issues and the technical appendix contains useful and detailed information. This chapter presents aviation activity statistics for Logan Airport in 2006 and compares activity levels to the prior year including air passengers, aircraft operations, fleet mix, and cargo/mail volumes. Air passenger traffic at Logan Airport reached 27.7 million, up from 27.1 million in 2005. The total number of aircraft

operations decreased in 2006 even though the total number of air passengers increased because airlines increased the number of passengers per aircraft operation. Specifically, the total number of aircraft operations declined from 409,066 in 2005 to 406,119 in 2006 which is a decrease of 0.7 percent. Air cargo volumes continued to decline from 728 million pounds in 2005 to 679 million pounds in 2006 with the largest volume decrease in the express/small packages. I advise Massport to consider and attempt to address all comments related to activity levels in the next 2007 EDR.

Planning

The Airport Planning chapter provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2006. It also describes known future planning, construction, and permitting activities. Specifically, several projects were completed in 2006. The new Terminal A, which opened on March 16, 2005, achieved Leadership in Energy and Environmental Design (LEED) certification in June 2006. It is the first airport terminal in the U.S. to earn this ranking. In addition, in November, 2006 the MBTA Silver Line service was enhanced with the addition of the Massachusetts Bay Transportation Authority's (MBTA) Charlie Card automatic fare collection kiosks in all Logan Airport terminals. Several construction projects were also completed, including the construction of the North Service Road (SR-2) Roadway Buffer, which consists of a sidewalk linking the Blue Line Airport Station to Logan Airport Terminals, and a landscaped area adjacent to the sidewalk. Construction of Phase 1 of the Southwest Service Area (SWSA) buffer, which began in 2005, was completed in the fall of 2006, and the Navy Fuel Pier Edge Buffer was completed in December 2006.

Regional Transportation

This chapter describes activity levels at New England's regional airports in 2006 and updates recent planning activities. Massport has demonstrated that it is coordinating its planning with other transportation agencies, and that this planning effort is aimed at minimizing cumulative impacts from Logan Airport operations. The 2006 EDR includes estimates of potential passenger diversions from Logan, and outlines how Massport planning encourages those diversions.

In general, the 2006 EDR has met the requirements laid out in the ESPR Certificate. The directives in the ESPR Certificate were laid out to have Massport look at potential diversions, and explain how its planning and coordination with other agencies could impact potential diversions. The 2006 EDR has performed this task.

Overall, the number of air passengers utilizing New England's primary commercial service airports in 2006 declined marginally, from 48.0 million to 47.9 million. When measured by the number of aircraft operations, however, activity levels fell by 4.4 percent, from 1.4 million operations to 1.3 million operations. This reflects substantial changes in the commercial aviation sector and the continued decline of general aviation (GA) noted in the 2005 EDR. Major airlines

reduced capacity at the regional airports in 2006 as they reconfigured their operations in an effort to consolidate gains made in bankruptcy and near-bankruptcy restructuring. Passenger declines were generally consistent with capacity reductions. In addition, the average aircraft size of scheduled flights to the regional airports declined in 2006 as airlines substituted regional jet service for mainline jets on certain routes. Declines in GA activity in New England (declined by 4.2 percent from 2005 levels) continue to outpace declines in the rest of the country. According to the FAA as reported in the 2006 EDR, GA activity declined by 1.3 percent nationally in 2006, largely due to rising fuel costs.

Ground Transportation

The 2006 EDR serves its purpose of updating 2006 ground access conditions on the airport, and has also adequately addressed the larger ground access issues identified in previous Certificates, as discussed below.

This chapter reports on transit ridership, roadways, traffic volumes, and parking for 2006. Specifically, ground transportation activity levels increased across the board from 2005 to 2006 as a result of a 2.4 percent increase in the number of air passengers. Also, a portion of I-90 connecting the City of Boston and areas to the south and west of Boston to Logan Airport was closed from July 2006 until early 2007, which is believed to have reduced traffic flows to and from the Airport. The 2006 EDR reports that ridership on the MBTA, Logan Express, water transportation, scheduled and unscheduled HOV Services, and taxis increased in 2006. This is due in part to the completion of roadway and other construction projects at the Airport, and to the closure of the I-90 connector to the Airport for much of 2006. Massport-subsidized service provided by the C & J Bus Company began in 2006 providing early morning transportation between New Hampshire and Logan Airport. The 2006 EDR also reports that the number of on-Airport parkers decreased by 8.4 percent in 2006.

Noise

The Noise Abatement chapter updates the status of the noise environment at Logan Airport in 2006, and describes Massport's efforts to reduce noise levels. The technical appendix contains useful and detailed information, while the main text provides a solid analysis of major noise issues. Many of the issues raised in the noise analysis are ongoing and require continuous monitoring a point raised by several commenters. The EDR represents an appropriate forum to serve this updating function.

In 2006, the overall number of people exposed to Day-Night Sound Level (DNL) values greater than 65 decibels (dB) decreased in 2006 compared to 2005. An estimated 5,583 people were exposed to DNL levels greater than 65 dB in 2006, compared to 6,477 in 2005, and 9,438 in 2004. For the second year in a row, fewer than 7,000 people experienced levels of 65 dB DNL and above. The 2006 Cumulative Noise Index (CNI) of 152.6 Effective Perceived Noise Level (EPNdB) remained well below the cap of 156.5 EPNdB. The CNI decreased compared to 2005

primarily because of decreased use of recertificated aircraft by cargo operators.

Massport provided sound insulation for 857 residential dwelling units in 2006. This is the largest number of units to receive sound insulation in the vicinity of the Airport in any one year since the beginning of the program. Since the program's inception, Massport has sound insulated a total of 9,943 dwelling units. The majority of the units insulated in 2006 were in Chelsea.

The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2007 EDR. I also strongly advise Massport to consider and address the comments received that have raised noise related concerns.

Air Quality

The Air Quality/Emissions Reduction chapter provides an overview of airport-related air quality issues in 2006 and efforts to reduce emissions.

The emissions inventory results are driven largely by improvements to the FAA Emissions and Dispersion Modeling System (EDMS), v5.0.1. These include the addition of aircraft main engine startup VOC emissions; adjustments to how aircraft performance profiles are modeled, which changed aircraft times-in-mode and thus emissions of all pollutants; an advanced method to calculate aircraft PM10/PM2.5 emissions; and updated ground support equipment (GSE) emission factors using NONROAD2005. The in-place air quality initiatives at Logan Airport and other ongoing efforts by Massport to minimize emissions also played a role, as did changes to aircraft taxi time, fleet mix, and number of operations.

The 2006 EDR reports that emissions inventory changes show an increase in VOC over 2005 levels attributed to the changes to EDMS. The 2006 EDR reported that total VOC emission number is up 34 percent (1,724 kg/day). The total NO_x emissions were one percent lower than reported in the 2005 EDR. In 2006, NOx emissions at Logan Airport were approximately 677 tons per year (tpy) lower than the 1999 threshold level established by Massport's Air Quality Initiative. This represents a 28 percent decrease since1999. There was a continuing trend of decreasing NO2 concentrations at both the Massport and Massachusetts Department of Environmental Protection (MDEP) monitoring sites located in the general vicinity of Logan Airport. In addition, in 2006 the annual NO2 concentrations at all monitoring locations were well below the NO2 air quality standards.

For the second year (2005 EDR was the first year), estimates of particulate matter emissions associated with Logan Airport are reported in this 2006 EDR in response to the recent availability of an FAA-approved method for computing particulate matter emission factors for aircraft. The total CO decreased 15 percent and the total PM_{10} /$PM_{2.5}$ decreased seven percent below the 2005 EDR reported numbers.

The 2006 EDR emissions inventory analysis used the actual aircraft fleet mix, except in the few

instances where aircraft/engine types or combinations were not available in the EDMS database. Data included aircraft type, engine, landing and takeoff operations (LTOs) and aircraft taxi times. Aircraft types are divided into four categories: commercial air carriers, commuter aircraft, general aviation and cargo.

The 2007 EDR should continue updates on the information presented in the 2006 EDR and address comments received related to air quality. In particular the City of Boston has raised several concerns the Massachusetts Department of Public Health's (DPH) Logan Airport Health Study and the air quality monitoring study. The 2007 EDR should update the status of discussions with the City of Boston related to this concern.

Last, I ask that Massport consult with the MEPA office regarding the recently promulgated Greenhouse Gas Emissions Policy and Protocol prior to subsequent filings.

Water Quality/Environmental Compliance

This chapter describes Massport's ongoing environmental management activities including NPDES compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan, and tank management. Specifically, Logan Airport experienced 92 hazardous material spills in 2006, 11 (12 percent) were considered reportable (i.e., over 10 gallons) under the applicable environmental regulations. Jet fuel spills accounted for 65 (71 percent) of the total spills, with nine of the jet fuel spills exceeding 10 gallons. The remaining 27 spills (29 percent) involved gasoline, hydraulic oil, diesel fuel, and other substances, including two reportable spills.

In 2006, only four of 332 outfall samples exceeded the regulatory limits. The West Outfall and the Maverick Street Outfall each had one sample which exceeded the 15 milligrams per liter (mg/L) National Pollutant Discharge Elimination System (NPDES) limit for oil and grease. The North Outfall had two samples which exceeded the 0.3 milliliters per liter (ml/L) daily maximum limit for settable solids. This is an improvement compared to 2005, when eight samples exceeded the regulatory limits. In accordance with the Massachusetts Contingency Plan (MCP), Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. In 2006, two of its five MCP sites were closed out, and Massport was working towards achieving regulatory closure of the three remaining MCP sites. In accordance with the Massachusetts Contingency Plan (MCP), Massport should continue to report in the 2007 EDR how Massport will assess, remediate, and bring to regulatory closure areas of subsurface contamination.

Sustainability at Logan Airport

This chapter describes Massport's airport wide sustainability goals. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable

design principles. In October 2004, the Massport Sustainability Team produced the *Massachusetts Port Authority Sustainability Plan* (Sustainability Plan). The Environmental Management Policy is incorporated in the Sustainability Plan as Massport's long-term sustainability goal or vision.

This chapter describes Massport's continued efforts including Massport-wide sustainability and details how sustainability is incorporated into many aspects of Massport's activities: Planning and Design; Construction; Operations, Maintenance and Management; and Monitoring of Environmental Performance.

Massport has been a leader in sustainable development. Terminal A, which opened in 2005, received LEED certification in 2006. It is the first airport terminal in the country to receive such certification, and is a model for other airports in the country. In addition, in an effort to reduce air pollutants, Massport is phasing in alternative fuel vehicles in place of conventionally-fuel vehicles. At the airport, Massport maintains electric vehicles infrastructure, as well as a privately operated CNG station to power newer vehicles. The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2007 EDR.

November 1, 2007
Date

Ian A. Bowles

Comments Received:

10/24/07	Nancy Timmerman
10/25/07	Stephen Kaiser
10/26/07	Town of Lincoln, Lincoln Board of Selectmen
10/31/07	City of Boston's Environment Department
10/31/07	The Boston Harbor Association

IAB/ACC/acc

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

October 31, 2008

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
2007 LOGAN AIRPORT ENVIRONMENTAL DATA REPORT

PROJECT NAME	: 2007 Environmental Data Report
PROJECT MUNICIPALITY	: Boston / Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 3247
PROJECT PROPONENT	: Massachusetts Port Authority
DATE NOTICED IN MONITOR	: September 24, 2008

As Secretary of Executive Office of Energy and Environmental Affairs (EEA), I hereby determine that the Environmental Data Report submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62I) and with its implementing regulations (301 CMR 11.00).

The environmental review process at Logan Airport has been structured to occur on two levels: airport-wide and project-specific. The Environmental Status and Planning Report (ESPR) has evolved from a largely retrospective status report on airport operations to a broader analysis that also provides a prospective assessment of long range plans. It has thus become (consistent with the objectives of the MEPA regulations) part of Massport's long range planning. In recognition of the increased role of planning in the Generic Environmental Impact Report (GEIR) process, the name of the document was changed to ESPR. The ESPR provides a "big picture" analysis of environmental impacts associated with current and anticipated levels of activities, and presents an overall mitigation strategy aimed at avoiding increases in such impacts. The ESPR analysis is supplemented by (and ultimately incorporates) the detailed analyses and mitigation commitments of project-specific EIRs. The ESPR is currently updated on a 5-year basis, with much less detailed Environmental Data Reports (EDR) (formerly Annual Updates) filed in the years between ESPRs. The 2007 EDR is the subject of this Certificate.

In general, the EDR has fulfilled its purpose of providing a "snapshot" of year 2007 passenger and impact levels at Logan Airport. Most environmental parameters showed improvement in calendar year 2007. In particular, the technical studies in the 2007 EDR included reporting on and analysis of key indicators of airport activity levels, airport planning, the regional transportation system, ground access, noise, air quality, environmental management, and project mitigation tracking. Mitigation of noise impacts and air quality remain key concerns both of this office and the commenters. These commitments take the form of project-specific Section 61 Findings, as well as more general mitigation that has emerged from the ESPR process.

Background

In 1979, the Secretary of the Executive Office of Environmental Affairs issued a Certificate requiring Massport to define, evaluate, and disclose, every three years, the impact of long-term growth at the airport through a Generic Environmental Impact Report (GEIR). The Certificate also required the submission of interim Annual Updates to provide data on conditions for the years between the GEIRs. The GEIR provided projections of environmental conditions where the cumulative effects of individual projects could be understood. The Secretary's Certificate on the *1997 Annual Update* proposed a revised environmental review process for Logan Airport. As a result, Massport evaluates the cumulative impacts associated with airport activities through preparation of an ESPR every five years and provides data updates annually through the EDRs.

Review of the 2007 EDR

As always, EEA remains committed to evaluating and addressing the cumulative impacts of airport operations on the nearby communities. In June 2001, Massport agreed to work with EEA on structuring a proposed Air Quality Initiative (AQI). The Certificate indicated that Massport was "to solicit project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM." The 2007 EDR reiterates that Massport has committed to the Air Quality Initiative, a key program designed to mitigate the cumulative air quality impacts of airport operations. The 2007 EDR details how Massport is meeting this commitment. The 2008 EDR should continue to report on the details of Massport's commitment and address the concerns raised by the commenters on this issue. In addition to the environmental issues listed below, the 2008 EDR should address all of the air quality and noise related issues raised by the commenters during the review of the 2007 EDR.

Procedural for 2008 EDR

Given the overall strength of the analysis in the 2007 EDR, the 2008 EDR can restrict itself to providing an update on 2008 conditions, and respond to those issues explicitly noted in this Certificate and the comments received as requiring response in the next EDR. The EDR should

provide a "snapshot" of the 2008 operations and impacts, with more substantial analysis awaiting the next ESPR. Massport should file the 2008 EDR no later than October 15, 2009 (although I encourage Massport to file sooner).

A distribution list for the 2008 EDR (indicating those receiving documents, CDs, or Notices of Availability) should be provided in the document. This section must also include copies of all ESPR and EDR Certificates issued since the 2004 Logan Environmental Status and Planning Report (issued on August 16, 2006) to provide context for reviewers. Supporting technical appendices should be provided as necessary.

Responses to Comments

The comments received on the 2007 EDR are thoughtful and detailed. The 2008 EDR must include Responses to Comments which addresses all of the substantive comments from the letters listed at the end of this Certificate. The Response to Comments included in this EDR is well-constructed and cross-referenced. Massport may follow the same format in addressing comments in the next EDR, although the Responses to Comments should pay particular attention to increased specificity, where necessary.

The majority of comments received on the 2007 EDR focused on air quality and noise related issues, including measurement of noise, modeling of noise contours, and noise abatement. In addition to responding to these comments, the 2008 EDR and future EDRs should also continue to report on the refinements to noise tracking and abatement efforts. Massport should consult directly with individual commentors where appropriate.

Organization of the Certificate

I have organized the remainder of this Certificate to respond to issues raised roughly in the order in which they were presented in the 2007 EDR, although I have for the most part incorporated discussion of issues raised in the technical appendix into the discussion of the environmental impact analyses.

Activity Levels

The Activity Levels chapter provides a solid analysis of major activity issues and the technical appendix contains useful and detailed information. This chapter presents aviation activity statistics for Logan Airport in 2007 and compares activity levels to the prior year including air passengers, aircraft operations, fleet mix, and cargo/mail volumes. In 2007, the total number of air passengers reached 28.1 million, up from 27.7 million in 2006. The increase in the total number of air passengers at Logan Airport was 1.4 percent compared to 2.4 percent in the previous year. Specifically, the total number of aircraft operations declined from 406,119 in 2006 to 399,537 in 2007, a decrease of 1.6 percent. Operations by general aviation (GA) aircraft

decreased most significantly (8.9 percent) in 2007 as compared to passenger and cargo operations. As a result of continued passenger growth and a reduction in operations, the number of air passengers per aircraft operation continued to increase in 2007. Air cargo volumes, continued to decline from 679 million pounds in 2006 to 632 million pounds in 2007. In addition to reporting the analysis of major activity issues, I advise Massport to consider and attempt to address all comments related to activity levels in the 2008 EDR.

Planning

The Airport Planning chapter provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2007. It also describes known future planning, construction, and permitting activities. Several projects were completed in 2007 including the International Gateway Project (Terminal E) Phase 2. The Federal Inspection Services (FIS) facility was enlarged and the new arrivals level was constructed with the other Phase 2 improvements. The replacement GA Facility in the North Cargo Area was completed and opened in June, 2007 and the southwest corner of Taxiway D was realigned. In addition, the Terminal Area Roadway Landscaping was completed in 2007 and significant portions of Bremen Street Park were completed in early 2007. Also Phase II of the West Garage Project was completed which added three levels of parking to the Central Garage.

Regional Transportation

In general, the 2007 EDR has met the requirements laid out in the ESPR Certificate with respect to regional transportation issues. This chapter describes activity levels at New England's regional airports in 2007 and updates recent planning activities. Massport has demonstrated that it is coordinating its planning with other transportation agencies, and that this planning effort is aimed at minimizing cumulative impacts from Logan Airport operations. The 2007 EDR includes estimates of potential passenger diversions from Logan, and outlines how Massport planning encourages those diversions. The total number of air passengers using New England's primary commercial service airports in 2007 increased marginally, from 47.13 million in 2006 to 47.2 million. Of the 47.2 million air passengers using New England's primary commercial service airports in 2007, 60 percent utilized Logan Airport as compared to 88 percent in 1995. When measured by the number of aircraft operations, activity levels fell by 2.1 percent, from 1.33 million operations in 2006 to 1.31 million operations in 2007.

The directives in the ESPR Certificate were laid out to have Massport look at potential diversions, and explain how its planning and coordination with other agencies could impact potential diversions. The 2007 EDR has performed this task. I direct Massport to continue the directive from the ESPR Certificate for the 2008 EDR.

This chapter also reflects that passenger traffic at the regional airports fell by 1.6 percent. Major airlines reduced capacity at the regional airports in 2007 because they eliminated unprofitable

routes and reduced their domestic flying to deal with the high and rising cost of fuel. Passenger declines were generally consistent with capacity reductions. Declines in GA activity in New England (declined by 3.5 percent compared with 2.6 percent nationally in 2007) continue to outpace declines in the rest of the country, which is largely attributed to the impact of rising fuel costs on recreational flying.

Ground Transportation

The 2007 EDR serves its purpose of updating 2007 ground access conditions on the airport, and has also adequately addresses the updating of the three new programs to support employees' use of alternative transportation options.

This chapter reports on transit ridership, roadways, traffic volumes, and parking for 2007. Specifically, ground transportation activity levels increased across the board from 2006 to 2007 as a result of a 1.4 percent increase in the number of air passengers. The re-opening of Interstate 90 (I-90) connecting the City of Boston and areas to the south and west of Boston to Logan Airport resulted in increased traffic flows to and from the Airport when compared to previous years. The 2007 EDR reports that ridership on water transportation, scheduled and unscheduled high occupancy vehicle (HOV) services, and employee ridership on Logan Express increased over 2005 levels. The 2007 EDR also reports that the number of on-Airport parkers decreased by 16.9 percent in 2007 compared to 2005. A portion of this decrease is likely due to the increase of pick-up and drop-off at the Airport.

I also note that this chapter discusses that the Logan Employee Transportation Management Association (Logan TMA) introduced and implemented three new programs to support employees' use of alternative transportation options: the Sunrise Shuttle, which provides shuttle services between 3:00 AM and 5:30 AM for Airport employees who reside in East Boston; the Logan TMA Preferential Carpooling, which provides free terminal garage parking to employees in Logan TMA member companies who carpool in groups of three or more; and the Commuter Cash program, which financially rewards employees ($3/day) who switch from driving alone to either carpooling, bicycling, walking, or using public transportation. The 2008 EDR should continue to update 2008 ground access conditions on the airport and report on the use of the three new programs to support employees' use of alternative transportation options.

Noise

The Noise Abatement chapter updates the status of the noise environment at Logan Airport in 2007, and describes Massport's efforts to reduce noise levels. The technical appendix contains useful and detailed information, while the main text provides a solid analysis of major noise issues. Many of the issues raised in the noise analysis are ongoing and require continuous monitoring, a point raised by several commenters. The future 2008 EDR represents an appropriate forum to serve this updating function.

2007 was the first full year of operation for Runway 14-32. Consistent with the 2002 Record of Decision (ROD) on the Airside Improvements Planning Project and based on FAA data, the runway was used primarily for arrivals over Boston Harbor during 2007. Consistent with historical patterns, despite the introduction of Runway 14-23, the FAA continued to rely on Logan Airport's north-south traffic flow in 2007. However, within the north-west flow, the FAA increased reliance on Runway 33L for departures with an associated reduction in Runway 27 departures. The changes in runway utilization in 2007 have led to changes in the noise environment. Since 2006, the noise contours over East Boston increased in extent and, over the same period, decreased over South Boston, Revere, and Winthrop.

The population within the 75-80 decibel (dB) DNL contours decreased in 2007 compared to 2006. In 2006, the population in the 75-80 dB DNL contour was 104 but in 2007 zero population was located in this coutour. In 2006, the population in the 70-75 dB DNL contour was 597 compared to 416 in 2007. The overall number of people exposed to Day-Night Sound Level (DNL) values greater than 65 decibels (dB) increased 36 percent compared to 2006. An estimated 7,591 people were exposed to DNL levels greater than 65 dB in 2007, compared to 5,583 in 2006. This is still well below the pre-September 11, 2001, level of 17,745. The residences exposed to DNL levels greater than 65 dB in 2007 are located within the 65 dB sound insulation contour, and thus are within areas that have been sound insulated by Massport. The comments from the Boston Transportation Department, the City of Cambridge as well as from individuals such as Mr. Peter Koff and Ms. Nancy Timmerman have raised a number of concerns and suggestions related to noise that Massport should consider incorporating into the 2008 EDR.

In 2007, Massport provided sound insulation to 548 homes, the majority of which were in Chelsea. Since the inception of Massport's Sound Insulation program, 10,461 homes in East Boston, South Boston, Winthop and Chelsea have received sound insulation.

The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2008 EDR. I also strongly advise Massport to consider and address the comments received that have raised noise related concerns.

Air Quality

The Air Quality/Emissions Reduction chapter provides an overview of airport-related air quality issues in 2007 and efforts to reduce emissions. The emissions inventory results were driven largely by three factors: changes in the aircraft fleet mix at the Airport (the airlines' substitution of select narrow-body aircraft with wide-body and commuter aircraft); the reported change in the aircraft average taxi/delay times at Logan Airport; and continual improvements to the FAA Emissions and Dispersion Modeling System (EDMS), v5.0.2, particularly in regard to the advanced method for calculating particulate matter (PM) emissions from aircraft engines. Because of the changes to the EDMS model, total modeled emissions of PM10/PM2.5 associated

with Logan Airport in 2007 appeared to have increased by approximately 64 percent to 128 kilograms per day (kg/day) compared to 2006 levels. By comparison, using the EDMS version available in 2006 (v5.0.1) total emissions of PM10/PM2.5 would have increased by approximately 5 percent to 82 kg/day due to a combination of changes in aircraft fleet mix and aircraft taxi/delay time. This data shows that the estimated increase in PM10/PM2.5 was due mostly to the updated EDMS model and not the result of significant changes in Airport operations. Nonetheless, the increases in modeled emissions are notable and I encourage Massport to revisit all feasible efforts to mitigate PM10/PM2.5 emmissions.

The 2007 EDR reports that the total emissions of volatile organic compounds (VOC) were 1,673 kg/day, or 3 percent lower than 2006 levels. Total emissions of carbon monoxide (CO) were 9,233 kg/day, or 13 percent higher than 2006 levels. Total emissions of oxides of nitrogen (NOX) were 4,457 kg/day, or 7 percent higher than 2006 levels. In 2007, total NOx emissions at Logan Airport were approximately 541 tons per year lower than the 1999 Air Quality Initiative (AQI) benchmark which represents a 27 percent decrease in NOx emissions at Logan Airport since 1999. There was also a continuing trend of decreasing nitrogen dioxide (NO2) concentrations at both the Massport and Massachusetts Department of Environmental Protection (MA DEP) monitoring sites located in the general vicinity of Logan Airport. In addition, the annual NO2 concentrations at all monitoring locations in 2007 were within the NO2 Air Quality Standards.

In the 2007 EDR Massport for the first time has voluntarily submitted its first emission inventory of greenhouse gas (GHG) emissions directly and indirectly associated with Logan Airport. "Direct emissions" are those that occur in areas located within the Airport's geographic boundaries and "indirect emissions" are those that occur off the Airport site. "Direct" GHG emissions associated with Logan Airport in 2007 were 0.37 million metric tons (MMT), and the sum of "direct" and "indirect" emissions was 0.69 MMT (less than 0.1 percent of state-wide totals). Massport has control of only 18 percent of these combined totals and will implement plans by 2009 to reduce further GHGs associated with its operations at Logan Airport helping minimize the Airport's carbon footprint.

The 2008 EDR should continue updates on the information presented in the 2007 EDR and address comments received related to air quality. In particular the Mr. Peter Koff has raised several concerns related to air quality monitoring and the Massachusetts Department of Public Health's (DPH) Logan Airport Health Study. The 2008 EDR should clarify this issue and update the status of any air quality monitoring related to this concern.

Water Quality/Environmental Compliance

This chapter describes Massport's ongoing environmental management activities including NPDES compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan, and tank management.

I note on July 31, 2007, the Environmental Protection Agency (EPA) and MA DEP issued a new National Pollutant Discharge Elimination System (NPDES) Program permit for Logan Airport's stormwater outfalls. The new NPDES permit regulates stormwater discharges from the North, West, Northwest, Porter Street, and Maverick Street Outfalls, and all of the airfield outfalls. The previous NPDES permit regulated stormwater discharges only from the North, West, Porter Street, and Maverick Street Outfalls. The new NPDES permit also has additional sampling requirements, including the requirement to sample for deicing compounds. In 2007, three of 404 outfall samples exceeded the regulatory limits contained in the NPDES permit. The Maverick Street Outfall had two samples exceed the 100 milligrams per liter (mg/L) daily maximum limit for Total Suspended Solids (TSS) and the West Outfall had one sample exceed this limit. This is an improvement compared to 2004 and 2006 when four samples exceeded the regulatory limits, and 2005 when eight samples exceeded the regulatory limits.

In 2007, Massport completed an update to the Airport's Stormwater Pollution Prevention Plan (SWPPP). The SWPPP addresses stormwater pollutants in general, and also addresses deicing and anti-icing chemical, potential bacteria, fuel and oil, and other sources of stormwater pollutants. Best management practices (BMPs) are included in the SWPPP. Also in accordance with the Massachusetts Contingency Plan (MCP), Massport continued to assess, remediate, and bring to regulatory closure areas of subsurface contamination. In 2007, Massport worked towards achieving regulatory closure of six remaining MCP sites. Massport should continue to report in the 2008 EDR how Massport will assess, remediate, and bring to regulatory closure areas of subsurface contamination.

Sustainability at Logan Airport

This chapter describes Massport's airport wide sustainability goals. In October 2000, the Massport Board approved an Authority-wide Environmental Management Policy, which articulates Massport's commitment to protect the environment and to implement sustainable design principles. In October 2004, the Massport Sustainability Team produced the *Massachusetts Port Authority Sustainability Plan* (Sustainability Plan). The Environmental Management Policy is incorporated in the Sustainability Plan as Massport's long-term sustainability goal or vision.

This chapter describes Massport's continued efforts including Massport-wide sustainability and details how sustainability is incorporated into many aspects of Massport's activities: Planning and Design; Construction; Operations, Maintenance and Management; and Monitoring of Environmental Performance which are detailed in this chapter. The replacement GA Facility in the North Cargo Area, which was constructed in early 2007 and opened in June 2007, is an example of planning and design sustainability initiatives being undertaken at Logan Airport. The new GA Facility incorporates sustainable design, construction, and operational elements. On the operations and maintenance in 2007, Massport created preferred parking areas in garages and

parking areas throughout Logan Aiport to promote use of lower emitting vehicles. In cooperation with the City of Boston, in the spring of 2007, Massport began a limited head-of-line privilege program for taxis using AFVs, helping to increase the use of alternatively-powered taxis. Additionally, in 2007, Massport created a Cell Phone Waiting Lot, a new parking area where drivers picking up arriving passengers can park for a maximum of 30 minutes. The information in this chapter is very informative and I encourage Massport to continue with its updates in the 2008 EDR.

Conclusion

As I stated at the beginning of this Certificate, the 2008 EDR must provide responses to the issues raised in comments received. The 2008 EDR must include a copy of this Certificate and a copy of each comment letter received on the 2007 EDR. In particular, Massport should provide a thorough examination of issues raised regarding individual noise monitoring locations, noise measurement and modeling, noise abatement, and air quality issues. Massport should consult directly with individual commentors where appropriate.

October 31, 2008
Date

Ian A. Bowles

Comments Received:

10/20/2008	Boston Transportation Department
10/20/2008	Peter L. Koff, Engel & Schultz, LLP
10/24/2008	Stephen H. Kaiser, PhD
10/27/2008	City of Cambridge, Robert Healy, City manager
10/28/2008	Nancy Timmerman

IAB/ACC/acc

B

Comment Letters and Responses

- The six comment letters received by the Massachusetts Environmental Policy Act (MEPA) Office on the *2008 Environmental Data Report (2008 EDR)* are reprinted here in the order shown below. As requested in Secretary of the Executive Office of Energy and Environmental Affairs' Certificate, Massport has provided responses to substantive comments raised in these letters.
  - Robert D'Amico, Boston Transportation Department
  - Bryan Glascock, Boston Environment Department
  - Robert Healy, City of Cambridge
  - Jerome Falbo, City of Winthrop
  - Peter L. Koff, Engel & Schultz, LLP.
  - Nancy Timmerman, P.E., consultant in Acoustics and Noise Control

BOSTON
TRANSPORTATION
DEPARTMENT

ONE CITY HALL PLAZA/ROOM 721
BOSTON, MASSACHUSETTS 02201
(617) 635-4680/FAX (617) 635-4295

November 4, 2009

RECEIVED
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MEPA

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: Logan Airport 2008 Environmental Data Report (2008 EDR) #3247

Dear Secretary Bowles:

The Boston Transportation Department (BTD) has reviewed the above mentioned document and is pleased to forward the following comments for your review.

Economic conditions had a dramatic effect on our regional economy and Logan Airport was no exception. A substantial portion of the environmental benefits experienced at Logan were a result of a 7% decrease in the number of flights as well as 7.1% decrease in the number of passengers that used the airport.

However, in spite of the sharp reduction in the operational criteria regarding Logan Airport, several important issues should be reviewed as they pertain to environmental impacts. In our view, they are as follows:

Airport Planning

The Southwest Service Area Redevelopment Program includes a Consolidated Rental Car Facility (ConRAC). The revised plan excludes 3,000 commercial spaces but remains an extremely massive project. What further exacerbates the concerns towards the project is its proximity to a heavily populated neighborhood. Quite literally, vehicles will be passing closely by the rear of three family homes. Not only will this be disturbing from, a noise perspective, but an air quality one as well. Without question, this will have a negative impact on the over-all quality of life for residents living close to this project. B-1

Page 2. Environmental Data Report (2008 EDR)

Many impacts involved with a major rental car facility often go ignored or innocently bypassed due to the perception of their minor importance or reduced impact when compared to the larger picture.

For example, rental car employees are often asked to shuttle vehicles to a variety of different locations, some within the environs of the facility while other locations could be a mile away or located in another state. Unfortunately, many of the individuals drive the cars at a high rate of speed resulting in high noise levels and negative air quality impacts. Especially when the vehicle is quickly accelerated from a dead stop or swiftly driven around a corner.

An additional impact for those living in close proximity to the ConRAC that may appear minor to others is the continuous sound of the individual on the speaker making some sort of comment, especially during the sensitive hours of the night when residents are trying to sleep. This has been an ongoing problem for Massport for many years and it will only get worse unless this issue is addressed prior to construction of the ConRAC.

Ground Transportation

BTD applauds Massport on addressing ground transportation impacts at Logan Airport. Programs such as the Sunrise Shuttle, Transportation Management Association (TMA) and the Maverick Street Gate have sharply reduced traffic impacts in East Boston. However, we would hope that Massport would apply a greater effort in attempting to stem the tide of decreasing membership in the Logan TMA. While it went up from 2007 to 2008, it remains far below the peak year of 2004. B-2

Finally, the Cell Phone Waiting Lot is one of the most accommodating and useful ideas to grace the airport in quite awhile. Not only does it present a convenient location to contact someone, it provides a certain level of safety by taking drivers off the road while talking on their cell phones.

Noise Abatement

Massport's new Noise Monitoring System (NOMS) will present more detailed information regarding noise impacts. Although this is welcome news, it does no good to the community or anyone else if the data is difficult or impossible to get upon request. If there is a problem with Massport's Noise Abatement Office (NAO), it is the issue of receiving the data requested. B-3

Page 3. Environmental Data Report (2008 EDR)

It is extremely frustrating when a resident or city official requests data that should be easily available to the public. This data should be available to anyone asking for it. People have a right to know what their impacts are. B-3 cont'd

In closing, BTD recognizes and appreciates Massport's strong effort in their attempt to manage a world class airport while simultaneously controlling environmental impacts. A daunting task to say the least. However, BTD looks forward to be working with Massport and neighborhood residents on future projects, to hopefully fulfill Massport's mission while controlling environmental impacts that affect nearby residents on a daily basis.

If you have any questions relative to this letter, please call Mr. Robert D'Amico at 617-635-3076.

Sincerely,

Robert D'Amico
Senior Planner

Comment #	Author	Topic	Comment	Response
B.1	Boston Transportation Department	Noise/Air Quality	The revised plan (ConRAC) excludes 3,000 commercial spaces but remains an extremely massive project. What further exacerbates the concerns towards the project is its proximity to a heavily populated neighborhood. Quite literally, vehicles will be passing closely by the rear of three family homes. Not only will this be disturbing from a noise perspective, but an air quality one as well.	Massport has carefully planned the siting and massing of the proposed Consolidated Car Rental Facility and intends to implement appropriate measures to mitigate noise and air quality impacts of the ConRAC project. *Chapter 3, Airport Planning and Chapter 9 , Project Mitigation Tracking,* documents the mitigation measures that will be implemented for the project.
B.2	Boston Transportation Department	Ground Transportation	BTD applauds Massport on addressing ground transportation impacts at Logan Airport. Programs such as the Sunrise Shuttle, TMA and the Maverick Street Gate have sharply reduced traffic impacts in East Boston. However, we would hope that Massport would apply a greater effort in attempting to stem the tide of decreasing membership in the Logan TMA. While it went up from 2007 to 2008, it remains far below the peak year of 2004.	As documented in *Chapter 5, Ground Transportation,* Massport continued its efforts to encourage membership in the Logan Employee Transportation Management Association (TMA) in 2009. In addition to offering TMA membership to firms and organizations, the TMA is also open to individual membership. This feature has been successful in recruiting new members.
B.3	Boston Transportation Department	Noise	Massport's new Noise Monitoring System (NOMS) will present more detailed information regarding noise impacts. Although this is welcome news, it does no good to the community or anyone else if the data is difficult or impossible to get upon request. If there is a problem with Massport's Noise Abatement Office it is the issue of receiving the data requested. It is extremely frustrating when a resident or city official request data that should be easily available to the public. This data should be available to anyone asking for it. People have a right to know what their impacts are.	Massport provides information on noise to community members, agencies and other interested parties as part of regular operating practice. Additional information is provided in *Chapter 6, Noise Abatement* and in *Appendix H* of this *2009 Environmental Data Report (EDR)* . Massport will continue to provide this service. If members of the public need specific noise-related information, they should contact the Noise Office at: www.massport.com/environment/environmental reporting/Noise%20Abatement/NoiseComplaints.aspx

November 10, 2009

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114
Attention: Anne Canaday, MEPA Office

Re: Logan Airport 2008 Environmental Data Report, EEA #3247

Dear Secretary Bowles:

The City of Boston Environment Department has reviewed the Massachusetts Port Authority's (Massport) Logan Airport (Logan) 2008 Environmental Data Report (EDR) and offers the following comments.

The schedule of annual EDR/Environmental Status Planning Report (ESPR) filings with the Executive Office of Energy and Environmental Affairs (EEA) Massachusetts Environmental Policy Act (MEPA) Office calls for an ESPR every five years and an annual EDR. Massport proposes to file a 2009 EDR in 2010 and an EDR in 2011 rather than an ESPR. The rationale is that activity levels at Logan Airport and associated environmental impacts continue to remain well below historic levels and recent peaks. Massport expects near-term activity levels and associated environmental impacts to remain well below previously analyzed levels.

As we understand it, the difference between an EDR and ESPR is the depth of "necessary background information to allow reviewing agencies and the public to understand the environmental policies and planning which form the context of the environmental reporting, technical studies, and environmental mitigation initiatives at Logan Airport" (September 10, 2004 Certificate of the Secretary of the Executive Office of Environmental Affairs, Ellen Roy Herzfelder). The intention is, therefore, that ESPRs provide a level of detail not required in an EDR. While we appreciate that difficult economic times have resulted in a far different scenario than projected in 2004, we believe that an ESPR remains an appropriate document and should be filed for 2009. These comments will identify areas in which we believe ESPR-level detail is necessary. C-1

Activity Level Changes

- Air passengers at Logan Airport declined by 7.1 percent from a record 28.1 million in 2007 to 26.1 million in 2008.
- The total number of aircraft operations declined 7.0 percent from 399,537 in 2007 to 371,604 in 2008 - total domestic (6.3), jet domestic (4.6) and regional/commuter (9), total international (7.1).
- Passenger aircraft operations decreased by 6.4 percent from 362,298 to 339,115.
- Operations by general aviation (GA) aircraft declined by 16.8 percent from 28,632 to 23,820.
- Cargo aircraft operations increased by 2.4 percent from 8,607 to 8,669. Air cargo volumes, excluding mail, declined from 632 million pounds in 2007 to 588 million pounds in 2008. Mail volume increased by 29.7 percent.
- Airlines reduced the number of aircraft operations at Logan Airport in response to high and rising fuel prices and declining passenger demand resulted in domestic and international capacity cuts, new passenger fees, increased fares and changes in the fleet mix. Turboprop and piston aircraft use was down 7.9 percent and there was a 2.45 percent increase in the use of newer regional jets which have up to 100 seats.

Regional Air Transportation Changes

- Total air passengers using New England's primary commercial service airports decreased by 5.9 percent from 47.2 million in 2007 to 44.4 million in 2008.
- Fifty-nine percent of 2008 passengers used Logan; 60 percent had used it in 2007.
- Aircraft operations fell by 7.7 percent, from 1.31 million operations in 2007 to 1.21 million operations in 2008.
- Decreased reliance on connecting service through Logan has continued; the EDR notes that it reduces pressure on Logan to accommodate small planes from small communities to other destinations, resulting in more convenient air service routings for passengers. The share of originating flights from the regional airports that end at Logan Airport decreased from 1.6 percent in 2007 to 0.7 percent in 2008.
- The average number of seats per scheduled flight at the regional airports increased from 84 in 2007 to 88 in 2008.
- Operations at New England regional airports by GA aircraft declined by 7.6 percent from 2007 levels. A reduction in recreational flying is attributed to the high cost of fuel.

Hanscom Field, a reliever airport in the regional system, no longer offers commercial service. Given the increase in the use of regional jets with 80-100 seats, we question if Massport's 29-year old Hanscom Noise Rules limiting aircraft to those with 60 or fewer seats are inhibiting air service to Hanscom that is appropriate and desirable. We ask that Massport address this issue in the 2009 ESPR. C-2

Regional Transportation Context

Massport's participation in the planning of regional transportation policy and the implementation of measures designed to maximize broad regional transportation options are important elements of the mitigation for the Airside Improvements Planning Project (AIPP). The Council of New England Governors and other policy decision makers, through the New England Regional Aviation System Plan (NERASP) Study, have a framework for integrated regional aviation and multi-modal transportation policy and planning. In March 2001, the New England Governors adopted a resolution to coordinate and implement regional transportation planning across the six New England states. The formal resolution created the Regional Transportation Coordinating Council (RTCC) to work with the FAA to study and increase regional airport use. The RTCC meets quarterly and consists of twelve members, with each governor appointing two members. The mission of the RTCC is to encourage federal transportation agencies to participate in the planning and funding of regional initiatives aimed at building and enhancing regional transportation infrastructure. RTCC efforts were folded into the two-phase NERASP Study; a report on the study was released in October 2006.

In our comments on the 2003 EDR, this department noted that a NERASP time-line showed an "Outreach" element in about May 2004 and that neither the nature of the outreach nor a community process described. We requested that the 2004 ESPR summarize the work and findings of the NERASP work group through 2004, describe a community process and process for review of Phase I work.

The 2004 ESPR provided some information from the NERASP Study about the criteria used by passengers in choosing airports, utilization data within the greater Boston system, and forecasted growth. Response to Comment 34 referred reviewers to the NERASP Web site for more detail.

In Phase II, the participants were to assess major public policies and regulations that guide systems planning and federal aviation policies or regulations that restrict intermodal planning. Public policies that would support the participants' recommendations for implementation of a regional strategy were to be identified.

Given the importance of the study, Massport's prominent role and that study results would include recommendations for improved regional planning and initiatives, we requested in 2005 EDR comments that detailed information be provided in the 2006 EDR.

Massport contributes to the following additional cooperative regional transportation planning and operation efforts:

- •Massport supports intercity rail planning through its membership and participation in the Boston Metropolitan Planning Organization (MPO).
- In 2007, Massport, together with nine other state transportation agencies, became a member of the Massachusetts Mobility Compact created by Governor Deval Patrick to improve the delivery of transportation services in Massachusetts by enhancing communication and cooperation among the state's transportation agencies in the planning, design, construction, and operation of transportation services.
- •Massport periodically participates in meetings of other regional and state aviation organizations and the Massachusetts Aeronautics Commissions.
- Massport also cooperates with other transportation agencies to promote transit operations.

Reviewers should not find it necessary to research the results of the NERASP Study or other regional planning and operation efforts in which Massport is a participant. We believe that the 2009 ESPR is the ideal vehicle for detailed reporting on the process, findings and recommendations of regional planning and studies with an emphasis on findings and recommendations pertinent to Massport's three airports. Massport's response to and plans for implementing recommendations should be detailed. C-3

Ground Transportation

Average daily traffic on Logan roadways decreased by 13 percent from 2007 to 2008; vehicle miles traveled (VMT) decreased by 11 percent.

Air passenger ridership on Logan Express bus service decreased by 14 percent in 2008 over 2007, water transportation use declined by 12 percent with Silver Line boardings at Logan increasing by 5 percent. Massport speculates that the increase in Silver Line ridership is likely due to some new ridership and diversion from other services such as water transportation, limousines, and taxis. Limousine ridership decreased by 19 percent and taxi dispatches decreased 9 percent. Ridership information for 2007 and 2008 were not provided to Massport from an unspecified number of van and bus companies.

The use of Logan Express, water transportation, limousine services and taxis all decreased in greater proportion than the number of air passengers; the five percent increase in Silver Line boardings would account for only a small number of passengers and serves different destinations than those provided by other modes. We ask that Massport discuss in the 2009 ESPR the likely cause(s) for this C-4

We continue to question the designation of limousines as high occupancy vehicles (HOV). Massport should explain in the ESPR the basis for this description and the manner in which data is collected. C-5

The EDR indicates that over the past several years, transit services have seen substantial increases in employee use. In 2008, the number of employees using Logan Express increased by 7 percent.

Membership in the Logan Transportation Management Association (Logan TMA) increased by 22.6 percent in 2008, from 2,641 in 2007 to 3,237; these numbers represent employees of sixteen member companies. No information is provided regarding the total number of companies at Logan. C-6

The 2009 ESPR should provide the following data:

- the total number of companies eligible for membership;
- the total number of part-time, contract and full-time employees of those companies (not reported in FTEs) and the percentage of total Logan employees;
- the number of individuals who have joined the Logan TMA. As we noted in 2006 EDR comments, eligibility criteria for TDM services can be a crucial element in a TMA's success. We surmise that many employees at Logan work part-time and/or split shifts. It is important

C-6 cont'd

to know if part-time and contract workers are not eligible for TMA services through their employers.

- If individual membership is no longer offered, the ESPR should describe the reason for this change.
- the specific services offered to any individual members;
- the length of time for which employees receive Commuter Cash benefits; and
- the specific marketing measures used to expand membership.

Transit pass subsidies, pre-tax payroll deduction and a Guaranteed Ride Home program are three of the most effective TDM methods. It appears that few transit pass subsidies are offered and that pre-tax payroll deduction and a Guaranteed Ride Home program are not TDM measures. Massport and tenants who provide parking are subsidizing spaces if employees pay any amount less than the commercial rates for on-airport parking and market rates for off-airport parking. We ask that the ESPR include a breakdown of TDM measures, the number of employees using each measure, the level of subsidy for transit passes and parking and a description of how the TMA is marketed to employers and individuals. C-7

We also note that bicycle accommodations and lockers & showers, useful for those who bike and walk to work are not identified as TDM options and we ask that the 2009 ESPR speak to this. If bicycle accommodations and lockers & showers are provided, please indicate their locations and eligibility for use. C-8

The 2007 EDR provided information obtained from an Employee Commute Survey conducted in 2007. The response rate was 18 percent. Massport reported employee origins, arrival and departure days/times (work shifts) and mode split. No information is provided about how and why employees make commute choices. The survey was not reproduced in the EDR so it is not possible to ascertain its parameters.

We believe it may be useful for the TMA administrator to periodically conduct interviews employees about their commuting choices and with tenants about their TDM practices and about the locations, numbers of spaces and charges for employee parking off-airport/in lots not owned or operated by Massport. TMA members would have an opportunity to identify what motivated them to join and the membership benefits most useful. Information from employees who are not members would help in developing services that meet their needs. A survey should also identify the number of employees for whom English is not a primary language and would find translated materials more accessible. We ask that a new survey be conducted in 2010 and the results reported in the 2010 EDR. C-9

Among other options, the Logan TMA continues to provide the Sunrise Shuttle which offers service between 3:00 A.M. and 5:30 A.M. for Logan employees who reside in East Boston. We applaud Massport for making this service available to employees who do not have transit alternatives at this time of day.

Massport had indicated in the 2004 ESPR that it continued to express to the Massachusetts Turnpike Authority (MTA) interest in Silver Line access to the "slip-ramp" and that the MTA responded that the ramp cannot accommodate buses and that a safety problem would be created for traffic in the HOV lane. Massport offered to prepare a Scope and fund a study but MTA declined. The slip ramp was used during a closure of the Ted Williams Tunnel which resulted in reduced pressure on the Callahan and Sumner Tunnels. Massport was to continue discussions with the MTA and indicated in the 2007 EDR that a contract for study of Silver Line access to the "slip ramp" was pending and the study, in coordination with the Massachusetts Bay Transportation Authority (MBTA) and MTA would be completed in 2008. There is no reference to the study in the 2008 EDR. We ask that detailed information be provided in the ESPR. C-10

<u>Noise Abatement</u>

- •The 2008 Day-Night Sound Level (DNL) contours were smaller in almost all locations compared to 2007.

- The population exposed to noise levels greater than DNL 70 dB decreased in 2008 compared to 2007. In 2007, the population greater than DNL 70 dB was 416 but in 2008 the number dropped to 249.
- The overall number of people exposed to DNL values greater than 65 dB decreased 26 percent in 2008 compared to 2007. An estimated 5,968 people were exposed to DNL levels greater than 65 dB as depicted in the 2008 contour, compared to 8,099 in 2007. The residences exposed to DNL levels greater than 65 dB in 2008 are located within the 65 dB sound insulation contour, and thus are within areas that already have been sound insulated by Massport.
- In 2008, Massport continued installing an improved Noise Monitoring System (NOMS). The flight tracking system and all new noise monitors were operational in 2008. Combined with new noise monitor software, the system has an improved capability of correlating measured noise events with individual flight tracks. This has greatly reduced differences between measured and modeled DNL values.

We concur with comments on the 2007 EDR noting that an explanation for significant changes in runway usage have not been provided, particularly the changes involving Runway 33L. We note that periodic noise from Runway 27 arrivals and Runway 33L departures has been experienced in the Fenway neighborhood of Boston during the past year. This has not previously been a problem. We request that the ESPR include an explanation of the changes that have resulted in this new impact and a discussion of how the impacts on residents are being assessed. C-11

Staff from this department and from the Boston Transportation Department (BTD) continues to participate in the Boston Logan Airport Noise Study (BLANS), now in its second phase. We look forward to continued work with Massport and the Federal Aviation Administration (FAA) in seeking improvements that are meaningful and enforceable.

Air Quality/Emissions Reduction

The EDR indicates that modeled emissions inventory results were driven by the lower number of aircraft operations at Logan compared to 2007; the reported change in the aircraft average taxi/delay times and improvements to the FAA Emissions and Dispersion Modeling System (EDMS), v5.1, which has revised methods for calculating particulate matter (PM) and hydrocarbon (HC) emissions from aircraft engines, and has new functionality of calculating PM emissions from auxiliary power units (APUs). Other factors were the change in stationary source fuel usage, and the change in VMT and parking volumes. Air quality initiatives in place at the Airport and other ongoing efforts by Massport to minimize emissions also played a role.

•The following are emissions changes reported in the 2008 EDR:

- $PM_{10}/PM_{2.5}$ associated with Logan have decreased from 2007 levels by approximately 37 percent to 81 kilograms per day (kg/day)
- Total emissions of volatile organic compounds (VOC) were 1,208 kg/day, 28 percent lower than 2007 levels.
- Total emissions of carbon monoxide (CO) were 8,361 kg/day, 9 percent lower than 2007 levels.
- Total emissions of oxides of nitrogen (NOX) were 4,204 kg/day, 6 percent lower than 2007 levels with total NOx emissions (net total with reductions) about 656 tons per year (tpy) lower than Massport's 1999 Air Quality Index (AQI) benchmark.
- There is a continuing trend of decreasing nitrogen dioxide (NO_2) concentrations at both the Massport and Massachusetts Department of Environmental Protection (MA DEP) monitoring sites located in the general vicinity of Logan. Annual NO_2 concentrations at all monitoring locations in 2008 were within National Ambient Air Quality Standards (NAAQS) standards.

Massport prepared an emission inventory of greenhouse gas (GHG) emissions directly and indirectly associated with Logan Airport. "Direct" GHG emissions, 0.35 million metric tons (MMT), occur in areas located within Logan's geographic boundaries; "indirect emissions" occur off of the airport. The combined total of "direct" and "indirect" emissions was 0.65 MMT. Massport operations at Logan contribute only 18 percent of these combined totals. GHG emissions in 2008 were 6 percent lower than 2007 levels.

As part of the Section 61 findings for the centerfield taxiway component of the AIPP, the first phase of a two-phase Massport Air Quality Monitoring Study was initiated in September 2007 at ten locations on- and off-airport using both real time and time-integrated methods to measure fine particulates, volatile organic compounds (VOC0, carbonyls, black carbon, and polynuclear aromatic hydrocarbons (PAHs). Monitoring was completed in September 2008. The 2007 EDR had indicated that Massport was reporting the monitoring results to the Massachusetts Department of Public Health (MDPH) and the Massachusetts Department of Environmental Protection (MA DEP). The 2008 EDR indicates that Massport meets periodically with MA DEP and DPH regarding the progress and results of the air monitoring. Massport expects that a report summarizing the phase one findings will be completed in 2009 and posted on its Web site. The second phase of the study will begin in once the centerfield taxiway is constructed and fully operational.

C-12

As we have said previously, the City of Boston sees the potential for collaboration, cumulative assessments of air quality and joint work to reach sound conclusions in the Air Quality Study. We had suggested that Massport and its air quality study consultant work with staff of the MA DPH, the MA DEP and the City of Boston Environment Department and Boston Public Health Commission (BPHC) to ensure a protocol that is acceptable to all parties. The Director of this department was invited to one meeting with other parties and we are unsure about the level of participation by each of the other two agencies. This department believes that credibility with Logan's neighbors can only be achieved if a study is based upon assumptions and a methodology that are accepted by the City and by state agencies that have expertise in the subject areas and, in the case of the DPH, had been involved in a closely related effort. While we recognize that Massport does not agree, it is our position that the Former Secretary Durand was astute in his June 2001 Certificate for the AIPP requirement that an objective, science-based process reviewed by a neutral organization be part of air quality impact assessment. The health and air quality studies are unprecedented and it is essential that the combined expertise of environmental and health professionals be harnessed to make the most of this exceptional opportunity. We ask that you strongly urge Massport to hold regular meetings with stakeholders, including this department, to help ensure the success of this effort.

C-13

The EDR indicates that Massport commissioned a study to evaluate operational, economic and environmental benefits of cogeneration as a way reduce air emissions associated with the Central Utility Plant. If cogeneration is found feasible, energy consumption could be reduced Airport-wide as could the emissions of criteria pollutants (i.e., CO, NOx, etc.) and GHGs. The status of this study is not described and we request that an update be provided in the ESPR.

<u>Project Mitigation</u>

Soft Shell Clam Planting and Monitoring Program

C-14

In June, 2007, Massport executed an Agreement with the Department of Marine Fisheries (DMF) relative to the Shellfish Relocation Plan required as a Section 61 Finding for the Runway End Safety Improvements Project. Under the Agreement, Massport will fund a series of alternative mitigation measures to be implemented by DMF, which include, but are not limited to: (1) improvements to the DMF soft-shell clam depuration facility in Newburyport, MA; (2) conversion of the DMF lobster hatchery on Martha's Vineyard to a soft-shell clam seed production facility; (3) a Boston Harbor water quality monitoring program; or (4) an extension of the DMF Boston Harbor Soft Shell Clam stock enhancement program. Massport made an initial payment in June 2007 and the final payment in 2009. The 2008 EDR does not indicate which measures were funded. We request that the 2009 ESPR provide this information.

Ground Service Equipment (GSE) Conversion

C-15

As mitigation for the Replacement Terminal A project, Delta Air Lines is to implement a program for conversion of its entire GSE fleet at Terminal A as soon as viable alternative fueled fleet vehicles become available and can be effectively integrated into Delta's operations at Terminal A. Massport reported the status as "Pending Implementation" in the 2007 EDR. In the 2008 EDR, the status is reported as "**Implemented.** Delta Air Lines continues evaluate availability of alternative fuel vehicles for integration into its GSE fleet."

C-15 cont'd

Specifics about the current state of availability and Delta's use of alternatively-fueled GSE should be provided in the 2009 ESPR. (An additional Section 61 Finding for Terminal A is that "Delta will provide Massport with an annual status report/update on the GSE conversion program at Terminal A, for inclusion in Massport's annual ESPR.") It would seem that these actions are "ongoing" rather than "implemented."

Testing alternative de-icing methods to reduce the amount of glycol usage.

This is also mitigation for the Replacement Terminal A project, and, like the prior two commitments, has been in place since at least 2003. Massport reports this measure as "**Implemented.** Delta Air Lines will continue to investigate de-icing alternatives." The 2009 ESPR should report on Delta's activities in this regard since the inception of this Section 61 finding. It would seem that these actions are "ongoing" rather than "implemented." C-16

As mitigation for the AIPP, Massport is to "Allow Massport's Logan Express satellite parking lots and stations available for third-party bus and park-and-ride connections to other regional airports, including Worcester, Manchester, and Providence. The measure is described as "**Implemented.** Upon request and review, Massport will continue to allow third party bus operators to provide service to regional airports from Logan Express facilities. In 2007, Massport enacted an agreement with Manchester-Boston Regional Airport to allow operation of a new shuttle service between Manchester-Boston Regional Airport and the RTC in Woburn." We request that Massport describe in the 2009 ESPR the criterion it uses in review of requests and the way in which it markets availability. C-17

<u>Sustainability</u>

In October 2004, Massport prepared the *Massachusetts Port Authority Sustainability Plan* which presents its short- and long-term sustainability goals, identifies the actions necessary to achieve the goals, the staff members responsible for each sustainability goal, and the timeline for achieving the goals. In 2008, Massport appointed its first Sustainability Program manager to oversee many of these initiatives. Massport also encourages its tenants to adopt sustainable practices.

Massport's Environmental Management Policy is incorporated in the Sustainability Plan. Specific goals include:

- Developing a policy that states that new development projects obtain certification under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™ and include LEED accredited professionals on the design team. (In 2008, the replacement Signature Flight Support GA Facility in the NCA was certified under the U.S. Green Building Council Leadership in Energy and Environmental Design® (LEED) Green Building Rating System™).
- •Establishing and implementing an Alternative Fuel Vehicle Policy (AFV) Policy that requires key personnel to review and consider AFVs when there is a request for a new or replacement vehicle and to select AFVs unless there is a compelling reason not to.
- Increasing construction waste recycling and reuse.
- Implementing a process to consider environmental impacts when making purchases.

Examples of vehicle-related sustainability efforts:

- All Massport diesel vehicles are fueled with ultra low-sulfur diesel and an E85 fuel (85 percent ethanol, 15 percent gasoline) dispensing tank has been installed in the North Cargo Area (NCA).
- In 2007, Massport installed parking heaters in two vehicles on a trial basis. The parking heaters operate independently of a vehicle's engine and Massport conducted the trial in order to measure the fuel savings/air emissions reductions associated with reduced vehicle idling time during snow operations. After evaluating the results of the trial and finding that the parking heaters resulted in draining vehicle batteries, Massport discontinued the trial in 2008. Massport will continue to explore anti-idling technologies as part of the EMS.

In March 2008, Massport installed 20 10-foot-tall wind turbines on the roof of Logan Office Center. The wind turbines are expected to generate approximately 100,000 kWh annually, or about 2 percent of the building's monthly energy use.

We applaud Massport for its existing and planned sustainability measures and look forward to more information in the 2009 ESPR. We are particularly interested in the performance of the building-mounted wind turbines. C-18

Thank you for the opportunity to comment. We look forward to a 2009 ESPR.

Sincerely,

Bryan Glascock
Director

Logan Airport 2008 EDR.doc:DBG/MTZ.mtz

Comment #	Author	Topic	Comment	Response
C.1	City of Boston Environment Department	MEPA	As we understand it, the difference between an EDR and ESPR is the depth of "necessary background information to allow reviewing agencies and the public to understand the environmental policies and planning which form the context of the environmental reporting, technical studies, and environmental mitigation initiatives at Logan Airport" (September 10, 2004 Certificate of the Secretary of the Executive Office of Environmental Affairs, Ellen Herzfelder). The intention is, therefore, that ESPRs provide a level of detail not required in an EDR. While we appreciate that difficult economic times have resulted in far different scenario than projected in 2004, we believe that an ESPR remains an appropriate document and should be filed for 2009.	Since 1997, Massport has followed a five-year filing cycle for the EDRs and Environmental Status and Planning Reports (ESPRs), with EDRs being filed for each year between the ESPRs. The last Logan ESPR was filed for calendar year 2004. Following the recent sequence of annual environmental filings, the environmental filing scheduled for next year was previously anticipated to be in the form of an ESPR rather than an EDR. However, due to the current economic downturn, as described in this *2009 EDR* , activity levels at Logan Airport and associated environmental impacts continue to remain well below historic levels and recent peaks. In 2010, near-term activity levels and associated environmental effects are also expected to remain well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the *2004 ESPR* —the predicate upon which the ESPR schedule was initially established —has not occurred. Massport proposed and the Secretary concurred that Massport would prepare a *2009 EDR* in lieu of the scheduled ESPR. Where appropriate, Massport will continue to identify and address any longer term aviation and environmental trends in each annual filing whether that be in the form of an EDR or ESPR. As outlined in the cover letter, an EDR is planned to report on calendar year 2010, the next ESPR is proposed to evaluate calendar year 2011.
C.2	City of Boston Environment Department	Noise	Hanscom Field, a reliever airport in the regional system, no longer offers commercial service. Given the increase in the use of regional jets with 80-100 seats, we question if Massport's 29-year old Hanscom Noise Rules limiting aircraft to those of 60 or fewer seats are inhibiting air service to Hanscom that is appropriate and desirable. We ask that Massport address this issue in the 2009 ESPR.	Hanscom Airfield is a premier airport serving general aviation and corporate users. The airport has provided commercial service in the past, but more recently, as a result of the downturn in the economy, commercial services were curtailed. This is a trend that is evident nationwide. As the economy revives, airlines may make the decision to once again provide service from Hanscom. Massport expects to provide the facilities to allow for airlines to offer these services. See *Chapter 4, Regional Transportation.*

Comment #	Author	Topic	Comment	Response
C.3	City of Boston Environment Department	Regional Transportation	Reviewers should not find it necessary to research the results of the NERASP Study or other regional planning and operations efforts in which Massport is a participant. We believe that the 2009 ESPR is the ideal vehicle for detailed reporting on the process, findings and recommendations of regional planning and studies with an emphasis on findings and recommendations pertinent to Massport's three airports. Massport's response to and plans for implementing recommendations should be detailed.	*Chapter 4, Regional Transportation* provides an overview of the New England Regional Airport System Plan (NERASP) study, including the findings and recommendations. The FAA is working with the airports in the New England states to invest in the airport facilities that best serve the region.
C.4	City of Boston Environment Department	Ground Transportation	The use of Logan Express, water transportation, limousine services and taxis all decreased in greater proportion than the number of air passengers; the five percent increase in Silver Line boardings would account for only a small number of passengers and serves different destinations than those provided by other modes. We ask that Massport discuss in the 2009 ESPR the likely cause(s) for this.	There is a no single, definitive answer for this suggested trend since mode share shifts do not track precisely with changes in air passenger volumes. Many factors play into a passenger's decision-making process as to how to get to and from Logan Airport. The 2010 Logan Airport Air Passenger Survey conducted in spring 2010 will provide the latest ground access mode share estimates, including high occupancy vehicle (HOV) mode share. The survey may help to explain the possible reasons affecting travel behavior and will be reported in the *2010 EDR.*
C.5	City of Boston Environment Department	Ground Transportation	We continue to question the designation of limousines as high occupancy vehicles (HOV). Massport should explain in the ESPR the basis for this description and the manner in which data is collected.	Vehicle occupancy is calculated for each of the vehicular ground-access modes based on the results of the periodic air passenger ground-access surveys. Survey respondents provide the mode of access and the number of passengers in their vehicle, and thus the average vehicle occupancy is calculated. The modes include private vehicles, rental cars, taxis, limousines by reservation, limousines/vans on a fixed schedule, and courtesy shuttles. Results from the 2007 Air Passenger Survey indicate that the average vehicle occupancy for limousines by reservation was 2.3 and limousines on a fixed schedule was 3.5. These figures will be updated with the new data from the 2010 Air Passenger Survey.

Comment #	Author	Topic	Comment	Response
C.6	City of Boston Environment Department	Ground Transportation	Membership in the Logan Transportation Management Association (Logan TMA) increased by 22.6 percent in 2008, from 2,641 in 2007 to 3,237; these numbers represent employees of sixteen member companies. No information is provided regarding the total number of companies at Logan. The 2009 ESPR should provide the following data: the total number of companies eligible for membership; the total number of part-time, contract and full-time employees of those companies (not reported in FTEs) and the percentage of total Logan employees; the number of individuals who have joined the Logan TMA. As we noted in 2006 EDR comments, eligibility criteria for TDM services can be a crucial element in a TMA's success. We surmise that many employees at Logan work part-time and/or split shifts. It is important to know if part-time and contract workers are not eligible for TMA services through their employers. If individual membership is no longer offered, the ESPR should describe the reason for this change. the specific services offered to any individual members; the length of time for which employees receive Commuter Cash benefits; and the specific marketing measures used to expand membership.	There are approximately 400 companies that have employees at Logan Airport. The top 15 companies employ about 50 percent of employees at Logan Airport, and most companies (about 92 percent) each employ fewer than 100 employees at the Airport. Any company or employee is able to participate in the TMA. MassRIDES actively markets its membership efforts to the larger employers. The early morning Sunrise Shuttle, which operates in East Boston, is available to all airport employees regardless of TMA affiliation. Information is not available on the percent or number of employees who are employed part-time or under temporary contract. As noted by the commenter, many employees work in shifts that do not correspond to traditional commuter work shifts. Hence, Massport has responded by supporting the Sunrise Shuttle, offering early morning Logan Express bus trips, and running free shuttles 24 hour-a-day from the Chelsea employee parking garage.
C.7	City of Boston Environment Department	Ground Transportation	Transit pass subsidies, pre-tax payroll deduction and a Guaranteed Ride Home program are three of the most effective TDM methods. It appears that few transit pass subsidies are offered and that pre-tax payroll deduction and a Guaranteed Ride Home program are not TDM measures. Massport and tenants who provide parking are subsidizing spaces if employees pay any amount less than the commercial rates for on-airport parking and market rates for off-airport parking. We ask that the ESPR include a breakdown of TDM measures, the number of employees using each measure, the level of subsidy for transit passes and parking and a description of how the TMA is marketed to employers and individuals.	MassRIDES, which provides the Logan TMA staff, is preparing to conduct a survey of major employers at Logan Airport to determine the number and type of employees, commute characteristics, commute travel subsidies, among other related characteristics. Massport will report on the findings in the *2010 EDR*, if available. In terms of on-airport parking, the Logan Airport parking freeze allows up to 3,373 spaces for employee use. Currently, Logan Airport has roughly 2,900 parking spaces for employees, or about 1 parking space for every 5 employees.
C.8	City of Boston Environment Department	Ground Transportation	We also note that bicycle accommodations and lockers & showers, useful for those who bike and walk to work are not identified as TDM options and we ask that the 2009 ESPR speak to this. If bicycle accommodations and lockers & showers are provided, please indicate their locations and eligibility for use.	Several buildings at Logan Airport have bicycle racks and shower/locker rooms available to bicycle commuters. These buildings include Massport's Logan Office Center, Terminal A, Signature General Aviation Terminal, and the planned ConRAC building.

Comment #	Author	Topic	Comment	Response
C.9	City of Boston Environment Department	Ground Transportation	We believe it may be useful for the TMA administrator to periodically conduct interviews employees about their commuting choices and with tenants about their TDM practices and about the locations, numbers of spaces and charges for employee parking off-airport/in lots not owned or operated by Massport. TMA members would have an opportunity to identify what motivated them to join and the membership benefits most useful. Information from employees who are not members would help in developing services that meet their needs. A survey should also identify the number of employees for whom English is not a primary language and would find translated materials more accessible. We ask that a new survey be conducted in 2010 and the results reported in the 2010 EDR.	MassRIDES, which provides the Logan TMA staff, is preparing to conduct a survey of major employers at Logan Airport to determine the number and type of employees, commute characteristics, commute travel subsidies, among other related characteristics. The results of the survey will be reported in the *2010 EDR,* if available.
C.10	City of Boston Environment Department	Ground Transportation	Massport had indicated in the 2004 ESPR that it continued to express to the Massachusetts Turnpike Authority (MTA) interest in Silver Line access to the "slip-ramp" and that the MTA responded that the ramp cannot accommodate buses and that a safety problem would be created for traffic in the HOV lane. Massport offered to prepare a Scope and fund a study but MTA declined. The slip ramp was used during a closure of the Ted Williams Tunnel which resulted in reduced pressure on the Callahan and Sumner Tunnels. Massport was to continue discussions with the MTA and indicated in the 2007 EDR that a contract for study of Silver Line access to the "slip ramp" was pending and the study, in coordination with the Massachusetts Bay Transportation Authority (MBTA) and MTA would be completed in 2008. There is no reference to the study in the 2008 EDR. We ask that detailed information be provided in the ESPR.	In 2009, Massport, in coordination with the MTA and MBTA, conducted an engineering review and analysis of the use of the emergency on-ramp in South Boston by the Silver Line buses. The engineering study included an analysis of Silver Line bus maneuvering, traffic operations, intersections and signals, travel times, and safety considerations. The engineering study evaluated two alternatives: use of the emergency on-ramp to I-90 EB and signal pre-emption on the existing SL1 route. The analysis and field tests demonstrated that the ramp is accessible from the Massport Haul Road with minimum impact to intersection operations at the State Police Barracks; the ramp geometry meets design standards for low-speed vehicle travel; the ramp provides adequate distance for acceleration and merging into the traffic stream at the HOV lane/I-90 eastbound lane; and the route would reduce travel time and vehicle-miles traveled. Implementation would include pavement markings, supplemental signing, vehicle detection system, signal pre-emption, and standard operating procedures.

Comment #	Author	Topic	Comment	Response
C.11	City of Boston Environment Department	Noise	We concur with comments on the 2007 EDR noting that an explanation for significant changes in runway usage have not been provided, particularly the changes involving Runway 33L. We note that periodic noise from Runway 27 arrivals and Runway 33L departures has been experienced in the Fenway neighborhood of Boston during the past year. This has not previously been a problem. We request that the ESPR include an explanation of the changes that have resulted in this new impact and a discussion of how the impacts on residents are being assessed.	The EDRs provide information on noise impacts and trends in the great Boston area, and in the Boston neighborhoods as well. *Chapter 6, Noise Abatement,* documents the noise environment, and shows maps of noise contours. The *2007 EDR* provided extensive information on runway use for Runways 33L and 27. Runway use was similar in 2008 and 2009. Questions on specific noise conditions should be directed to Massport's Noise Office (617-561-3333). The noise modeling conducted in support of this *2009 EDR* incorporates the runway use and flight track changes in the model results.
C.12	City of Boston Environment Department	Air Quality	As we have said previously, the City of Boston sees the potential for collaboration, cumulative assessments of air quality and joint work to reach sound conclusions in the Air Quality Study. We had suggested that Massport and its air quality study consultant work with staff of the MA DPH, the MA DEP and the City of Boston Environment Department and Boston Public Health Commission (BPHC) to ensure a protocol that is acceptable to all parties. The Director of this department was invited to one meeting with other parties and we are unsure about the level of participation by each of the other two agencies. This department believes that credibility with Logan's neighbors can only be achieved if a study is based upon assumptions and a methodology that are accepted by the City and by state agencies that have expertise in the subject areas and, in the case of the DPH, had been involved in a closely related effort. While we recognize that Massport does not agree, it is our position that the Former Secretary Durand was astute in his June 2001 Certificate for the AIPP requirement that an objective, science-based process reviewed by a neutral organization be part of air quality impact assessment. The health and air quality studies are unprecedented and it is essential that the combined expertise of environmental and health professionals be harnessed to make the most of this exceptional opportunity. We ask that you strongly urge Massport to hold regular meetings with stakeholders, including this department, to help ensure the success of this effort.	Massport worked closely with regulatory agencies during study planning and subsequent first year of monitoring for the Logan Air Quality Monitoring Study. During the study planning phase, meetings were held to discuss the project scope, and address agency comments which were received from MassDEP and Massachusetts DPH. During the actual monitoring phase, quarterly meetings were held with MassDEP and DPH to review the progress of monitoring and the data collection processes. Massport anticipates continuing to work closely with MassDEP and DPH and welcomes the input from other agencies like the Boston Environment Department during the second year of monitoring. At the completion of the second year of monitoring, Massport is committed to complete a scientifically based assessment of the collected data. The exact scope of the assessment will be worked out with the regulatory agencies while the second year of monitoring is being conducted beginning September 2010. Massport anticipates that work performed under this study will be reviewed by MassDEP and DPH, and other interested agencies. The Work Plan, which describes the monitoring program in detail, and monitoring data report from the first year can be found on Massport's website: (http://www.massport.com/environment/environmental_reporting/Documents/aq_work_plan.pdf).

Comment #	Author	Topic	Comment	Response
C.13	City of Boston Environment Department	Air Quality	The EDR indicates that Massport commissioned a study to evaluate operational, economic and environmental benefits of cogeneration as a way reduce air emissions associated with the Central Utility Plant. If cogeneration is found feasible, energy consumption could be reduced Airport-wide as could the emissions of criteria pollutants (i.e., CO, NOx, etc.) and GHGs. The status of this study is not described and we request that an update be provided in the ESPR.	In an effort to enhance the energy profile and reduce air emissions associated with the Central Utility Plant, Massport commissioned a study to evaluate operational, economic and environmental benefits through cogeneration. The study was completed in February 2008 and further information is provided in *Chapter 7, Air Quality/Emission Reduction* .
C.14	City of Boston Environment Department	Mitigation	Soft Shell Clam Planting and Monitoring Program: In June, 2007, Massport executed an Agreement with the Department of Marine Fisheries (DMF) relative to the Shellfish Relocation Plan required as a Section 61 Finding for the Runway End Safety Improvements Project. Under the Agreement, Massport will fund a series of alternative mitigation measures to be implemented by DMF, which include, but are not limited to: (1) improvements to the DMF soft-shell clam depuration facility in Newburyport, MA; (2) conversion of the DMF lobster hatchery on Martha's Vineyard to a soft-shell clam seed production facility; (3) a Boston Harbor water quality monitoring program; or (4) an extension of the DMF Boston Harbor Soft Shell Clam stock enhancement program. Massport made an initial payment in June 2007 and the final payment in 2009. The 2008 EDR does not indicate which measures were funded. We request that the 2009 ESPR provide this information.	Massport has requested an update in the status of the Soft Shell Clam Planting and Monitoring Program from the Division of Marine Fisheries. This information will be reported in the *2010 EDR.*
C.15	City of Boston Environment Department	Mitigation	Ground Service Equipment (GSE) Conversion: As mitigation for the Replacement Terminal A project, Delta Air Lines is to implement a program for conversion of its entire GSE fleet at Terminal A as soon as viable alternative fueled fleet vehicles become available and can be effectively integrated into Delta's operations at Terminal A. Massport reported the status as "Pending Implementation" in the 2007 EDR. In the 2008 EDR, the status is reported as "Implemented. Delta Air Lines continues evaluate availability of alternative fuel vehicles for integration into its GSE fleet." Specifics about the current state of availability and Delta's use of alternatively-fueled GSE should be provided in the 2009 ESPR. (An additional Section 61 Finding for Terminal A is that "Delta will provide Massport with an annual status report/update on the GSE conversion program at Terminal A, for inclusion in Massport's annual ESPR.") It would seem that these actions are "ongoing" rather than "implemented."	As part of the replacement of Terminal A, the world's first LEED certified airline terminal, Delta Air Lines agreed to introduce battery powered tugs and belt loaders for their ground service fleet at Terminal A. Delta purchased 50 electric baggage cart tugs, 25 electric baggage conveyor belt vehicles, and charging stations for each vehicle. To help Delta meet this commitment, Massport provided funding assistance for the purchase of the zero-emissions baggage cart tugs and conveyor belt vehicles. As of this filing, the GSE charger installations have been completed, and are currently using electric GSE.

Comment #	Author	Topic	Comment	Response
C.16	City of Boston Environment Department	Mitigation	Testing alternative de-icing methods to reduce the amount of glycol usage: This is also mitigation for the Replacement Terminal A project, and, like the prior two commitments, has been in place since at least 2003. Massport reports this measure as "Implemented. Delta Air Lines will continue to investigate de-icing alternatives." The 2009 ESPR should report on Delta's activities in this regard since the inception of this Section 61 finding. It would seem that these actions are "ongoing" rather than "implemented."	*Chapter 9, Project Mitigation Tracking,* reports that the measure to test de-icing methods to reduce the amount of glycol usage is ongoing (see Table 9-5).
C.17	City of Boston Environment Department	Mitigation	As mitigation for the AIPP, Massport is to "Allow Massport's Logan Express satellite parking lots and stations available for third-party bus and park-and-ride connections to other regional airports, including Worcester, Manchester, and Providence. The measure is described as "Implemented. Upon request and review, Massport will continue to allow third party bus operators to provide service to regional airports from Logan Express facilities. In 2007, Massport enacted an agreement with Manchester-Boston Regional Airport to allow operation of a new shuttle service between Manchester-Boston Regional Airport and the RTC in Woburn." We request that Massport describe in the 2009 ESPR the criterion it uses in review of requests and the way in which it markets availability.	To date the only request for access to Logan Express lots was by Manchester-Boston Regional Airport, which was approved. Access by new vehicles is generally related to space and scheduling.
C.18	City of Boston Environment Department	Sustainability	We applaud Massport for its existing and planned sustainability measures and look forward to more information in the 2009 ESPR. We are particularly interested in the performance of the building-mounted wind turbines.	*Chapter 1, Introduction/Executive Summary* provides a status report on Massport's sustainability initiatives including a review of the energy projects.

AC

CITY OF CAMBRIDGE • EXECUTIVE DEPARTMENT

Robert W. Healy, City Manager *Richard C. Rossi, Deputy City Manager*

November 5, 2009

RECEIVED
NOV 6 - 2009
MEPA

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street
Boston, MA 02114

Re: EOEA #3247 Logan Airport 2008 EDR

Dear Secretary Bowles:

The City of Cambridge is pleased to have the opportunity to submit comments on Massport's 2008 Logan Environmental Data Report (EDR).

The City continues to be greatly disturbed by the continued, increased use of runway 33L, which began in 2007, continued in 2008, and has resulted in significantly higher levels of noise and disturbance in all parts of the City. The reason for the increased noise is clear when examining the runway use figures in the 2008 EDR. For example, Table 6-4 shows that between 2004 and 2008, the use of runway 33L for departures has increase from 6% to 19%, while the use of runway 27 for departures decreased by almost the same amount, from 18% to 7%. Table 6-15 shows that Cambridge is the source of the second highest number of complaint calls to Massport from any community, with the number of complaints increasing from 622 in 2007 to 674 in 2008. D-1

Given this substantial change in runway use, the EDR should provide an explanation and justification for shifting the burden of noise from one group of communities to another without an environmental evaluation being conducted. According to FAA and Massport, the Logan noise study, which is on-going, was to be the vehicle for consideration of change in use of runways and arrival/departure procedures. Accordingly, we urge you to require, that Massport and FAA begin a process directly with affected communities to explain and address our concerns about the changes in runway use, outside of the noise study process, as part of this certificate on the EDR.

Please feel free to contact Bill Deignan at 617-349-4632 if you have any questions in regard to these comments.

Very truly yours,

Robert W. Healy
City Manager

Comment #	Author	Topic	Comment	Response
D.1	City of Cambridge	Noise	The City continues to be greatly disturbed by the continued increased use of Runway 33L, which began in 2007, continued in 2008, and has resulted in significantly higher levels of noise and disturbance in all parts of the City. The reason for the increased noise is clear when examining the runway use figures in the 2008 EDR. For example, Table 6-4 shows that between 2004 and 2008, the use of runway 33L for departures has increased from 6% to 19% while the use of Runway 27 for departures decreased by almost the same amount, from 18% to 7%. Table 6-15 shows that Cambridge is the source of the second highest number of complaint calls to Massport from any community, with the number of complaints increasing from 622 in 2007 to 674 in 2008. Given this substantial change in runway use, the EDR should provide an explanation and justification for shifting the burden of noise from one group of communities to another without an environmental evaluation being conducted. According to FAA and Massport, the Logan noise study, which is on-going, was to be the vehicle for consideration of change in use of runways and arrival/departure procedures. Accordingly, we urge you to require, that Massport and FAA begin a process directly with affected communities to explain and address our concerns about the changes in runway use, outside of the noise study process, as part of this certificate on the EDR.	The FAA assigns runway usage based on existing traffic and meteorological conditions. The expanded use of Runway 33L during 2008 was due to then-existing air traffic, ground traffic, and weather conditions. *Chapter 6, Noise Abatement,* documents runway usage in 2009. As part of the ongoing Boston Logan Airport Noise Study (BLANS) Massport is evaluating alternative flight track and runway use options.

AC

TOWN OF WINTHROP
NOISE, AIR POLLUTION & AIRPORT HAZARDS COMMITTEE

Town Hall - Winthrop, MA 02152

Robert L. Driscoll Sr., Chairman
617-846-6952
Jerome Falbo, Vice Chairman
617-846-3433
Thomas McNiff, Secretary
Richard Rodes, Treasurer
Representative Robert DeLeo
Richard N. Bangs
Richard D. Dimes
Brian Dumser
Harvey Malbor
Charles Mason
Constance Pike
Board of Selectmen (Representative)

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October 26, 2009

Executive Office of Energy and
Environmental Affairs
100 Cambridge Street, Suite 900
Boston, Ma. 02114
Attention: Ian A. Bowles, Secretary

Re: Logan Airport 2008 Environmental Data Report (2008 EDR) - EEQEA #3247

Dear Secretary Bowles:

On behalf of the Town of Winthrop Airport Hazards Committee, I submit the following comments on the above mentioned document for your review.

As you are aware the Town of Winthrop is severely impacted by the flight operations at Logan Airport. The quality of life for Winthrop residents suffer as a result of flight operations impacts seven days a week 365 days per year. Winthrop residents suffer noise and air quality impacts due to our proximity to Logan Airport. However, we firmly believe that both the Massport Authority (Massport) and the Federal Aviation Administration (F.A.A.) must improve our quality of life by putting forth a greater effort in an overall environmental mitigation program. Below please find several of the issues adversely affecting Winthrop and methods and ways we believe Massport and F.A.A. can work together to improve the overall quality of life for our Town's residents.

1. __**Reverse Thrust**__:

   This action is one of the most harmful events to the health and well being to Winthrop residents yet, it occurs everyday with each flight that arrives at Logan. E-1

While we do not wish to compromise safety, we would like Massport and the F.A.A. to work together in an attempt to create a method/technique whereby pilots can safely bring their

E-1 cont'd

aircrafts to an appropriate speed to either vacate a runway or come to a complete stop with a minimum amount of reverse thrust.

As you are aware, Massport has built high speed turnoffs on Logan Runways that provide the pilot a safe method to exit the runway at an accelerated rate of speed. We believe that there must be a way to use the high speed turnoffs at Logan Airport in such a manner that reduce the level of reverse thrust required for an aircraft to safety exit any runway. If this is achieved, the noise impact on the Town of Winthrop will be greatly reduced.

2. **Taxiing Noise**:

Secondary to reverse thrust, noise from taxiing aircraft have a negative impact on Winthrop residents.

During peak hours of operation, aircraft taxiing for departure, especially on Runways 22R/22L and 27 have a significant negative impact on the Town of Winthrop's residents. As the number of taxiing aircrafts increase as they wait in queue, the noise and air particulates increase as well. This negative impact will further be exacerbated by the construction of the Centerfield Taxiway (CFT).

The F.A.A. alleged that the Centerfield Taxiway would preserve or improve the environmental impacts at Logan Airport. The Town of Winthrop's residents strongly disagree with that opinion. The Centerfield Taxiway will soon be completed and the full impact of its operations will significantly affect the quality of life for the residents. It does not make any sense how an increase in the number of aircraft taxiing at the same time can result in both noise and air quality benefits. E-2

Our stated problems will worsen as a result of the construction of the Centerfield Taxiway, as there could be anywhere from 10-15 aircraft at one time taxiing closer to the Town of Winthrop. The so called "Citizen's Panel Review" process for the Centerfield Taxiway which was required by the F.A.A.'s Record of Decision, was totally ineffective and without merit. Its final result was nothing more than a dog and pony show to justify construction of the Taxiway.

Massport with the cooperation of the F.A.A. and the airline representatives serving Logan Airport develop a program of implementing a single engine taxiing program for twin engine aircraft and a double engine taxiing program for four engine aircraft which would occur on takeoffs and landings at Logan Airport. Massport has forwarded a few letters to the airlines encouraging single engine taxiing. We believe that any program that significantly reduces Community noise and air quality impacts needs more of a commitment from all parties involved. E-3

Important Issues:

Taxiing at the lowest possible speed, and taxiing with engines nearest the Community side to act as a shield and further reducing the noise in the Community.

These recommendations are challenging. However, we believe that if F.A.A. and Massport are serious about noise abatement for closed in Communities, the challenge would be a very small price to pay for providing some noise benefits to an overwhelming Community.

3. **Night Flights**:

We are aware that Massport has limited control over who may use the airport. However, it must develop an innovative and unique approach in controlling night time noise impact. One method would be a thrift incentive whereby an airline would receive a discount and landing fee if the aircraft is certified as a new stage three powered aircraft. The airline using older stage three or hush kitted aircraft would pay the normal landing fee. E-4

4. **Runway Assignment System**:

The current Preferential Runway Advisory System (PRAS) at Logan Airport while well intended, does not work. Massport must develop an affective runway assignment system to simplify its operations and reduce the work load for F.A.A. controllers. E-5

With the construction of 14/32, F.A.A. controllers now have three runways available regardless of the wind direction which equals the playing field for all runway assignments. Therefore, if the criteria for runway use is reduced to three choices, F.A.A. personnel can monitor, dwell and persistency more accurately and with far less effort. E-6

We support the use of a noise abatement computer system to control the environment impacts. However, it can not occur unless Logan's operational criteria and runway selection process is significantly simplified. E-7

There is no debate that daily operations of a large International Airport during these current times is hardly an easy task. However, people living close to an airport must not be placed in a position that they suffer serious impacts. Both Massport and F.A.A. must give significantly more consideration to the environmental impacts. There is much that must be done by both agencies in

Comment #	Author	Topic	Comment	Response
E.1	Town of Winthrop	Noise	[Reverse thrust is] one of the most harmful events to the health and well-being [of] Winthrop residents yet, it occurs everyday with each flight that arrives at Logan. While we do not wish to compromise safety, we would like Massport and the FAA to work together in an attempt to create a method/technique whereby pilots can safely bring their aircrafts to an appropriate speed to either vacate a runway or come to a complete stop with a minimum of reverse thrust. As you are aware, Massport has built high speed turnoffs on Logan Runways that provide the pilot a safe method to exit the runway at an accelerated rate of speed. We believe that there must be a way to use the high speed turnoffs at Logan Airport in such a manner that reduce the level of reverse thrust required for an aircraft to safely exit any runway. If this is achieved, the noise impact on the Town of Winthrop will be greatly reduced.	The BLANS will evaluate the feasibility of reverse thrust and other options to reduce noise effects. Phase II of the BLANS is scheduled to continue into 2011 as the critical noise options are examined.
E.2	Town of Winthrop	Noise	The FAA alleged that the Centerfield Taxiway would preserve or improve the environmental impacts at Logan Airport. The Town of Winthrop's residents strongly disagree with that opinion. The Centerfield Taxiway will soon be completed and the full impact of its operations will significantly affect the quality of life for the residents. It does not make any sense how an increase in the number of aircraft taxiing at the same time can result in both noise and air quality benefits. Our stated problems will worsen as a result of the construction of the Centerfield Taxiway, as there could be anywhere from 10-15 aircraft at one time taxiing closer to the Town of Winthrop. The so called "Citizen's Panel Review" process for the Centerfield Taxiway which was required by the FAA's Record of Decision, was totally ineffective and without merit. Its final result was nothing more than a dog and pony show to justify construction of the Taxiway.	The centerfield taxiway has been constructed and is being utilized as planned.
E.3	Town of Winthrop	Noise	Massport with the cooperation of the FAA and the airline representatives serving Logan Airport develop a program of implementing a single engine taxiing program for twin engine aircraft and a double engine taxiing program for four engine aircraft which would occur on takeoffs and landings at Logan Airport. Massport has forwarded a few letters to the airlines encouraging single engine taxiing. We believe that any program that significantly reduces Community noise and air quality impacts needs more of a commitment from all parties involved.	The BLANS will also evaluate the feasibility and benefits of implementing a formal single engine taxiing program. The findings will be reported when available. See *Chapter 6, Noise Abatement* for additional information on single engine taxiing.

Comment #	Author	Topic	Comment	Response
E.4	Town of Winthrop	Noise	We are aware that Massport has limited control over who may use the airport. However, it must develop an innovative and unique approach in controlling night time noise impact. One method would be a thrift incentive whereby an airline would receive a discount and landing fee if the aircraft is certified as a new stage three powered aircraft. The airline using older stage three or hush kitted aircraft would pay the normal landing fee.	Over 99 percent of aircraft that use Logan Airport are Stage 3 aircraft. Over 98 percent meet the future Stage 4 requirements.
E.5	Town of Winthrop	Noise	The current Preferential Runway Advisory System (PRAS) while well intended, does not work. Massport must develop an [effective] runway assignment system to simplify its operations and reduce the workload for FAA controllers.	Consideration of runway use and runway assignments is also a topic of study in the BLANS.
E.6	Town of Winthrop	Noise	With the construction of 14/32, FAA controllers now have three runways available regardless of the wind direction which equals the playing field for all runway assignments. Therefore, if the criteria for runway use is reduced to three choices, FAA personnel can monitor dwell and persistency more accurately and with far less effort.	Consideration of runway use and runway assignments is also a topic of study in the BLANS.
E.7	Town of Winthrop	Noise	We support the use of a noise abatement computer system to control the environmental impacts. However, it can not occur unless Logan's operational criteria and runway selection process is significantly simplified.	Consideration of runway use and runway assignments is also a topic of study in the BLANS.

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ENGEL & SCHULTZ, LLP.
Attorneys at Law

265 Franklin Street, Suite 1801
Boston, MA 02110-2704

Peter L. Koff
Of Counsel

Phone: (617) 951-9980
Facsimile: (617) 951-0048
E-Mail: pkoff@comcast.net

October 22, 2009
(Corrected October 26, 2009)

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street
Boston, MA 02114

Re: EOEA #3247
Logan Airport 2008 EDR

Dear Secretary Bowles:

I am submitting the following comments on Massport's 2008 Environmental Data Report (EDR).

Massport has once again produced a comprehensive report which provides a wealth of useful information across a wide spectrum of Logan Airport activities and community impacts. The quality and quantity of the information presented by Massport and its consultants obviously reflects a serious commitment to make the EDR a useful tool for both agencies and individuals to use in assessing the impacts of the Airport and Massport's progress in meeting mitigation goals and commitments.

Nevertheless, I do want to comment on several ways in which some of the noise abatement information in Chapter 6 and Appendix H could be further improved in the EDR for 2009. First, the EDR should more frequently be used not just to report the data which shows significant runway use and noise impact changes, but to explain the reasons for these changes; and to do so not just comparing the reporting year to the previous year, but also to discuss these changes over a number of years which can reflect a wider picture. F-1

For example, in my comments on the 2007 EDR, I suggested that Massport should provide a meaningful explanation of the reasons for the significant increased use of Runway 33L for jet aircraft departures (and corresponding decrease in use of Runway 27). In response to these comments, the 2008 EDR (Appendix B, page B-6, Comments 1.25 and 1.26) refers to Table 6-4, along with Figures 6-4 and 6-5 and accompanying text. But Table 6-4 simply presents the runway use percentages, and the text does not contain any explanation of the changes from the previous year. Figures 6-4 and 6-5 present bar graphs of jet departures by operating direction and a comparison on use of Runway 27 and Runway 33L, respectively. The accompanying text offers no explanations of the significant increased use of Runway 33L for jet departures, and significant decrease in use of Runway 27.

The same need for an explanation of significant runway use changes relative to all runways is presented by the 2008 EDR. For example, and focusing again on Runway 33L and Runway 27, Table 6-4 (page 6-18) shows that, between 2004 and 2008, the relative frequency of use of Runway 33L and F-2

Ian A. Bowles, Secretary
October 22, 2009 (corrected October 26, 2009)
Page Two

Runway 27 for jet aircraft departures has almost exactly been reversed. Between 2004 and 2008, Runway 27's use for departures dropped from 18% to 6%.[1] During this same time, Runway 33L's use for departures rose from 6% to 19%. Similarly, Table 6-5 shows a wide disparity in achievement of the Preferential Runway Advisory System ("PRAS") effective use goals for these two runways: Runway 27 moved further well-below its effective use goal of 17.9%, dropping from 8.7% to 7.1% in 2008; and Runway 33L, which has an effective use goal of 11.9%, showed only a very modest improvement from 17.0% to 16.2% in 2008. The EDR should provide an explanation of why the FAA has significantly increased jet departures on Runway 33L and reduced jet departures on Runway 27, particularly since there has been a significant controversy over why runway use changes were made after the opening of Runway 14/32 late in 2006, and in violation of Federal Aviation Administration commitments that no changes would be made until after PRAS was revisited in the Logan noise study. F-2 cont'd

A second area which needs further explanation in the 2008 EDR is the discussion of PRAS. A number of questions, still unanswered, should be dealt with in the next EDR, including the following:

1. Given that PRAS has not been operational for more than five years, by what date does Massport expect it to be operational. Massport's Section 61 Findings state that PRAS will be maintained until a revision to PRAS is adopted. F-3

2. Even though PRAS has not been available, it is left unclear in the 2008 EDR (as in prior EDRs) whether PRAS goals (effective use, and dwell and persistence) fit into runway use decisions by the FAA. In other words, does Massport discuss with the FAA the on-going data on runway use and suggest to the FAA what runway use patterns might be adjusted in order to better achieve PRAS goals; and if so, whether the FAA, where possible, takes achievement of the PRAS goals into account in its runway use decisions. F-4

3. If not, then Massport should make more clear in its discussion of PRAS goals that the reported trends toward, or away from, these goals are simply being reported for informational purposes and do not imply any FAA or Massport actions to improve compliance with PRAS.

Finally, it is suggested that Massport include runway use statistics, runway by runway, showing not just the runway use percentages, but the actual *number of operations for each runway*, broken down by *day and night*. This additional data would help residents better understand the number of operations over their neighborhoods, and the relative use of the runways at night. F-5

Sincerely yours,

Peter L. Koff

[1]In 2006, prior to the opening of Runway 14/32, Runway 27 was used for 13% of the jet aircraft departures, and for 2008 after two years of reporting the percentage has decreased to 6%.

Comment #	Author	Topic	Comment	Response
F.1	Engel & Schultz, LLP	Noise	I do want to comment on several ways in which some of the noise abatement information in Chapter 6 and Appendix H could be further improved in the EDR for 2009. First, the EDR should more frequently be used not just to report he data which shows significant runway use and noise impact changes, but to explain the reasons for these changes; and to do so not just comparing the reporting year to the previous year, but also to discuss these changes over a number of years which can reflect a wider picture. For example, in my comments on the 2007 EDR, I suggested that Massport should provide a meaningful explanation of the reasons for the significant increased use of Runway 33L for jet aircraft departures (and corresponding decrease in use of Runway 27). In response to these comments, the 2008 EDR (Appendix B, page B-6, Comments 1.25 and 1.26) refers to Table 6-4, along with Figures 6-4 and 6-5 and accompanying text. But Table 6-4 simply presents the runway use percentages, and the text does not contain any explanation of the changes from the previous year. Figures 6-4 and 6-5 present bar graphs of jet departures by operating direction and a comparison on use of Runway 27 and Runway 33L, respectively. The accompanying text offers no explanations of the significant increased use of Runway 33L for jet departures, and significant decrease in use of Runway 27.	Massport's *2009 EDR* and future EDRs/ESPRs will continue to explain, where possible, reasons for significant changes in aircraft operations, runway use, flight tracks and other reported data.

Comment #	Author	Topic	Comment	Response
F.2	Engel & Schultz, LLP	Noise	The same need for an explanation of significant runway use changes relative to all runways is presented by the 2008 EDR. For example, and focusing again on Runway 33L and Runway 27, Table 6-4 (page 6-18) shows that, between 2004 and 2008, the relative frequency of use of Runway 33L and Runway 27 for jet aircraft departures has almost exactly been reversed. Between 2004 and 2008, Runway 27's use for departures dropped from 18% to 6%. During this same time, Runway 33L's use for departures rose from 6% to 19%. Similarly, Table 6-5 shows a wide disparity in achievement of the Preferential Runway Advisory System ("PRAS") effective use goals for these two runways: Runway 27 moved further well-below its effective use goal of 17.9%, dropping from 8.7% to 7.1% in 2008; and Runway 33L, which has an effective use goal of 11.9%, showed only a very modest improvement from 17.0% to 16.2% in 2008. The EDR should provide an explanation of why the FAA has significantly increased jet departures on Runway 33L and reduced jet departures on Runway 27, particularly since there has been a significant controversy over why runway use changes were made after the opening of Runway 14/32 late in 2006, and in violation of FAA commitments that no changes would be made until after PRAS was revisited in the Logan noise study.	Massport's *2009 EDR* and future EDRs/ESPRs will continue to explain, where possible, reasons for significant changes in aircraft operations, runway use, flight tracks and other reported data.
F.3	Engel & Schultz, LLP	Noise	Given that PRAS has not been operational for more than five years, by what date does Massport expect it to be operational. Massport's Section 61 findings state that PRAS will be maintained until a revision to PRAS is adopted.	Review of PRAS is under consideration as part of the BLANS.
F.4	Engel & Schultz, LLP	Noise	Even though PRAS has not been available, it is left unclear in the 2008 EDR (as in prior EDRs) whether PRAS goals (effective use, and dwell and persistence) fit into runway use decisions by the FAA. In other words, does Massport discuss with the FAA the ongoing data on runway use and suggest to the FAA what runway use patterns might be adjusted in order to better achieve PRAS goals; and if so, whether the FAA, where possible, takes achievement of the PRAS goals into account in its runway use decisions. If not, then Massport should make more clear in its discussion of PRAS goals that the reported trends toward, or away from, these goals are simply being reported for informational purposes and do not imply any FAA or Massport actions to improve compliance with PRAS.	Review of PRAS is under consideration as part of the BLANS.

Comment #	Author	Topic	Comment	Response
F.5	Engel & Schultz, LLP	MEPA	Finally, it is suggested that Massport include runway use statistics, runway by runway, showing not just the runway use percentages, but the actual number of operations for each runway, broken down by day and night. This additional data would help residents better understand the number of operations over their neighborhoods, and the relative use of the runways at night.	This information is provided in Table H-3 in *Appendix H, Noise Abatement* of the *2009 EDR*.

Nancy S. Timmerman, P.E.
Consultant in Acoustics and Noise Control
25 Upton Street
Boston, MA 02118-1609
(617)-266-2595 (Phone & FAX)
nstpe@hotmail.com
nancy_timmerman@comcast.net

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November 5, 2008

The Honorable Ian A. Bowles, Secretary
MEPA Office
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Subject: EOEA #3247-Logan Airport 2008 Environmental Data Report (EDR)

Dear Secretary Bowles:

These comments are being transmitted by email and fax.

I have reviewed the 2008 Environmental Data Report (EDR), EOEA #3247 and offer the following comments and questions. First of all, the information on to whom to send the comments was not included in the transmittal letter. I hope I have sent it to the right people. G-1

With respect to Section 1, this reviewer recommends that the five-year schedule be maintained, and that the next report be an ESPR, with multi-year comparisons. The reduction in aviation activity is not a reason for not doing these comparisons. G-2

With respect the the Noise sections (6 and H), I offer the following comments and questions:

The computed CNI for 2008 was HIGHER than the value in 2007, with a decrease in operations. This appears to be from the passenger jet component. What specific aircraft types increased in use in 2008 to cause this higher CNI? G-3

If actual radar tracks are used in the modeling, why are "groups" of aircraft (Heavy A & B, etc.) still used? They were not compared with other years, so it can't be for that reason. G-4

Since the modeling process is computing DNL for each day, should not the actual meteorological data be used, instead of an annual average? G-5

It is disturbing to note, from Table 6-6 that even with fewer flights, there are still 244 people exposed to 70 to 75 DNL, according to the model. How long ago were these homes "sound insulated"? G-6

Which jets flying at Logan meet the Stage 4 noise standard? G-7

What ordering is used in Tables 6-8 and 6-9? It is not site numerical, or town alphabetical, or level, or disance. G-8

What is the accuracy of the modeled noise data? G-9

In the Flight Track Monitoring Report, for Runway 9 departures, there were smaller percentages of aircraft meeting the altitude requirement for the Swampscott and Revere gates. What steps are Massport and the FAA taking to improve compliance with the stated procedures? G-10

Also in the Flight Track Monitoring Report, the number of jets not complying with the Runway 33L departure procedures increased from 6.4% in 2007 to 10.3% in 2008. This would appear to be of concern, especially since there is more usage of Runway 33L with the current operational procedures (with 14/32). What steps has Massport taken to bring this discrepancy to the attention of the FAA? G-11

From Table H-10, an average of on the order of 114 commercial jet operations occur at night. Assuming half arrivals and departures, that could be 57 awakenings in a 9-hour "night", at some locations. What number of these are now between midnight and 6 am? G-12

Thank you for giving me the opportunity to comment on this report.

Sincerely,

, PE

Nancy S. Timmerman, P.E.

cc: J. Wilkins
Letter to MEPA Office/EOEA #3247--2008EDR

order to insure that human existence near Logan Airport can become enjoyable again.

Sincerely,

Jerome E. Falbo

JEF/dmh
CC: Speaker of the House
Representative Robert A. DeLeo

Comment #	Author	Topic	Comment	Response
G.1	Nancy S. Timmerman, P.E.	MEPA	First of all, the information on to whom to send the comments was not included in the transmittal letter. I hope I have sent it to the right people.	Massport distributes copies of the Massachusetts Environmental Policy Act (MEPA) cover letter with each EDR that is distributed (hard copies and CDs). The cover letter indicates the deadline for submittal of comment letters to MEPA. Future letters will include the MEPA address.
G.2	Nancy S. Timmerman, P.E.	MEPA	With respect to Section 1, this reviewer recommends that the five-year schedule be maintained, and that the next report be an ESPR, with multi-year comparisons. The reduction in aviation activity is not a reason for not doing these comparisons.	Massport requested a deviation from the standard five-year schedule because recent economic activity resulted in many fewer operations in 2009, and many fewer forecast for 2010; to conduct a full ESPR on 2009 data would not be responsible expenditure of public funds. MEPA concurred with this request. For the same reasons, Massport has proposed that an EDR be prepared for 2010, and that an ESPR would report on calendar year 2011.
G.3	Nancy S. Timmerman, P.E.	Noise	The computed CNI for 2008 was HIGHER than the value in 2007, with a decrease in operations. This appears to be from the passenger jet component. What specific aircraft types increased in use in 2008 to cause this higher CNI?	As discussed in the *2008 EDR* on page 6-36, the increase was mainly due to a revision in the underlying certification data which provided up-to-date data for the aircraft types currently serving Logan Airport. The prior database used substitutions for many aircraft since many types were unavailable.
G.4	Nancy S. Timmerman, P.E.	Noise	If actual radar tracks are used in the modeling, why are "groups" of aircraft (Heavy A & B, etc.) still used? They were not compared with other years, so it can't be for that reason.	The data were sorted into historical "groups" so that they can be compared to the same table in previous EDRs. The "groups" were not used in the modeling since actual radar tracks were used.
G.5	Nancy S. Timmerman, P.E.	Noise	Since the modeling process is computing DNL for each day, should not the actual meteorological data used, instead of an annual average?	The actual average daily meteorological data was used for each day in the *2008 EDR* and will be in future EDR/ESPRs.
G.6	Nancy S. Timmerman, P.E.	Noise	It is disturbing to note, from Table 6-6 that even with fewer flights, there are still 244 people exposed to 70 to 75 DNL, according to the model. How long ago were these homes "sound insulated?"	The homes were insulated as part of Massport's sound insulation program and have benefitted from this mitigation since the 1980s.
G.7	Nancy S. Timmerman, P.E.	Noise	Which jets flying at Logan meet the Stage 4 noise standard?	The majority of the jet aircraft at Logan Airport meet the Stage 4 noise standard. As reported in the *2009 EDR,* the percent of aircraft that meet the Stage 4 requirements is 98.4 percent and is shown in Table 6-2.
G.8	Nancy S. Timmerman, P.E.	Noise	What ordering is used in Tables 6-8 and 6-9? It is not site numerical, or town alphabetical, or level, or distance.	In Tables 6-8 and 6-9 of the *2008 EDR* , the towns were considered individually but no other order was used. In the *2009 EDR,* the tables listed the monitoring locations in numerical order to better correspond with the figure.

Comment #	Author	Topic	Comment	Response
G.9	Nancy S. Timmerman, P.E.	Noise	What is the accuracy of the modeled noise data?	The modeled noise data are only as accurate as the data which are input into the model and the underlying model database and prediction model. There are no published statements about the accuracy of the model but comparisons such as the measured vs. modeled tables attempt to display a relative accuracy to the modeling.
G.10	Nancy S. Timmerman, P.E.	Noise	In the Flight Track Monitoring Report, for Runway 9 departures, there were smaller percentages of aircraft meeting the altitude requirement for the Swampscott and Revere gates. What steps are Massport and the FAA taking to improve compliance with stated procedures?	The BLANS will consider implementation of Required Navigation (RNAV) procedures (a global positioning technology) to help achieve better conformance to altitude requirements.
G.11	Nancy S. Timmerman, P.E.	Noise	Also in the Flight Track Monitoring Report, the number of jets not complying with the Runway 33L departure procedures increased from 6.4% in 2007 to 10.3% in 2008. This would appear to be of concern, especially since there is more usage of Runway 33L with current operational procedures (with 14/32). What steps has Massport taken to bring this discrepancy to the attention of the FAA?	Massport collaborates with the FAA and staff routinely meet on various issues associated with procedures, flight tracks and other items.
G.12	Nancy S. Timmerman, P.E.	Noise	From Table H-10, an average of 114 commercial jet operations occur at night. Assuming half arrivals and departures, what could be 57 awakenings in a 9-hour "night", at some locations. What number of these are now between midnight and 6 a.m.?	For all night operations, there are on average 71 arrivals per night and 53 departures with 20 arrivals and 8 departures between midnight and 6 AM.

C

Proposed Scope for the 2010 EDR

PROJECT NAME:	*Logan Airport 2010 Environmental Data Report* (*2010 EDR*)
PROJECT LOCATION:	East Boston, Massachusetts
EOEA NUMBER:	3247
PROJECT PROPONENT:	Massachusetts Port Authority (Massport)

Massport respectfully submits this proposed scope for the *Logan Airport 2010 Environmental Data Report* (*2010 EDR*) for public review and comment. Massport has evaluated the cumulative impacts associated with Logan Airport activities through preparation of an Enviromental Status and Planning Report (ESPR) every five years and provides data updates annually through the EDRs. Following the recent sequence of Logan Airport annual environmental filings, the environmental filing for 2009 was previously anticipated to be in the form of an ESPR rather than an EDR. However, due to the current economic downturn, as described in the *2009 EDR*, activity levels at Logan Airport and associated environmental impacts continue to remain well below historic levels and recent peaks. The Secretary's Certificate on the *2008 EDR* approvedthe preparation of a *2009 EDR*.

Based upon available 2010 data, near-term activity levels and associated environmental effects are still expected to remain well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the *2004 ESPR*—the predicate upon which the ESPR schedule was initially established—has not yet occurred. Accordingly, Massport proposes to prepare a *2010 EDR* in lieu of an ESPR. As indicated in the following proposed scope for the *2010 EDR*, where appropriate, Massport will continue to identify and address any longer term aviation and environmental trends in each annual filing whether that is in the form of an EDR or ESPR.

Purpose of the *Logan Airport 2010 Environmental Data Report*

The *2010 EDR* will provide an annual update on conditions at Logan Airport for calendar year 2010. The EDR will continue to serve as a background/context against which projects at Logan Airport can be evaluated. It also will report on the cumulative effects of Logan Airport operations and activities, compared to 2009.

<u>**Contents of the *2010 Environmental Data Report***</u>

The *2010 EDR* will report on 2010 passenger and aircraft operation activity levels. This will be followed by a status report on Massport's proposed planning initiatives and projects. The technical reports in the Environmental Data Report will include indicators of noise, ground access, air quality, water quality, environmental compliance and project mitigation tracking. Each chapter's contents are described below.

1. Introduction/Executive Summary

This chapter of the *2010 EDR* will include:

- Overview of Logan Airport and place it in its environmental, geographic, and regulatory context
- Overview of the EDR/Environmental Status and Planning Report (ESPR) cycle
- Summary of activity levels and operations
- Overview of the Logan Airport planning initiatives and projects
- Summary of regional and ground transportation, noise, air quality, and water quality/environmental compliance
- Overview of sustainability initiatives at Logan Airport
- Description of the organization of the *2010 EDR*

2. Activity Levels

A primary purpose of this chapter will be to report on airport activity levels for 2010, including:

- Aircraft operations, including fleet mix and scheduled airline services at Logan Airport
- Passenger activity levels
- Cargo and mail
- Compare 2010 aircraft operations, cargo/mail operations, and passenger activity levels to 2009 activity levels
- Report on national aviation trends in 2010 and compare to trends at Logan Airport

3. Airport Planning

Massport continues to assess planning strategies for improving Logan Airport's operations and services in a, safe, secure, more efficient, and environmentally sensitive manner. As owner and operator of Logan Airport, Massport also must accommodate and guide tenant development. This chapter will describe the status of planning initiatives for the following areas:

- Terminal Area
- Airside Area
- Service and Cargo Areas
- Airport Buffers and Landscaping

The chapter also will report on the status of public works projects implemented by other agencies within the boundaries of Logan Airport.

4. Regional Transportation Context

The *2010 EDR* will describe Logan Airport's role in the region's intercity transportation system by reporting on the following:

Regional Airports
- 2010 regional airport operations, passenger activity levels, and schedule data within an historical context
- Status of plans and new improvements as provided by the regional airport authorities
- Ground Access improvements to the regional airports
- The role that Worcester Regional Airport and Hanscom Field play in the regional aviation system and Massport's efforts to promote these airports

Regional Transportation System
- Massport's efforts in strengthening the regional transportation system
- Massport's cooperation with other transportation agencies to promote efficient regional highway and transit operations
- Report on metropolitan and regional rail initiatives and ridership

5. Ground Transportation

The chapter will report on 2010 conditions and provide a comparison of 2010 findings to those of 2009 for the following:

- High occupancy vehicle (HOV) ridership (including Blue Line, Silver Line, Scheduled, Unscheduled, Water Transportation, and Logan Express)
- Logan Airport Employee Transportation Management Association (Logan TMA) membership and services
- Logan Airport gateway volumes
- On-airport traffic volumes
- On-airport vehicle miles traveled (VMT). VMT will be calculated using the updated model created in 2004 that is based on the full build roadway network
- Parking demand and management (including rates and duration statistics)
- Ground access management strategy
- Results of the 2010 Air Passenger Survey

6. Noise Abatement

This chapter will provide an overview of the environmental regulatory framework affecting aircraft noise, the changes in aircraft noise, and the updates in noise modeling. The chapter will report on 2010 conditions and compare 2010 conditions to those of 2009 for the following:

- Fleet Mix, including Stage II, Recertified (Hushkitted) Stage III, newly manufactured Stage III, and qualifying Stage IV aircraft
- Nighttime operations
- Runway utilization (report on aircraft and airline adherence with runway utilization goals)
- Preferential runway advisory system (PRAS) compliance

- Flight tracks, including a discussion of the update on the Standard Terminal Automation Replacement System (STARS) radar and consolidation of the Boston Terminal Radar Approach Control (TRACON) at Merrimac, plus Massport's installation and use of PASSUR data

The chapter will report on 2010 conditions and compare those to 2009 conditions for the following noise indicators:

- Using the Federal Aviation Administration's (FAA) most current version of the Integrated Noise Model (INM), and RealContours™ and RealProfiles™, produce an accurate set of Day-Night Sound Level (DNL) noise contours. Adjustments made to account for over-water sound propagation and the propagation of sound to areas of higher terrain will be reported
- Noise-impacted population
- Measured versus modeled noise values, including reasons for differences and any improvements attributable to the use of RealContours™ and RealProfiles™
- Cumulative Noise Index (CNI)
- Times-Above for 65, 75, and 85 dBA threshold values/Dwell and Persistence of noise levels
- Installation and benefits of the new noise monitoring system
- Flight track monitoring noise quarterly reports

The chapter will also report on noise abatement efforts and provide a status update on the new noise and operations monitoring system.

7. Air Quality/Emissions Reductions

This chapter will begin with an overview of the environmental regulatory framework affecting aircraft emissions, changes in aircraft emissions, and the changes in air quality modeling. The chapter will discuss analysis methodologies and assumptions and report on 2010 conditions using the most recent versions of the Emissions Dispersion Modeling System (EDMS) and MOBILE motor vehicle emissions. The chapter will include:

- Emissions inventory for carbon monoxide (CO)
- Emissions inventory for oxides of nitrogen (NO_x)
- Emissions inventory for volatile organic compounds (VOCs)
- Emissions inventory for particulate matter (PM)
- Nitrogen dioxide (NO_2) monitoring
- NO_x emissions by airline

This chapter will also report on the following air quality initiatives (AQI) for 2010:

- Air Quality Initiative Tracking
- Massport's and Tenant's Alternative Fuel Vehicle Programs
- The status of other Logan Airport air quality studies undertaken by Massport or others

This chapter will include an inventory of greenhouse gas (GHG) emissions from Logan Airport in 2010. GHG emissions will be quantified for aircraft, GSE, motor vehicles and stationary sources using emission factors and methodologies outlined in the Greenhouse Gas Emissions Policy and Protocol issued by EEA. The results of the 2010 GHG emissions inventory will be compared to the 2009 results.

8. Water Quality/Environmental Compliance and Management

This chapter will report on the 2010 status of:

- National Pollutant Discharge Elimination System (NPDES) Permit and monitoring results for Logan Airport's outfalls and the Fire Training Facility
- Jet fuel usage and spills
- Massachusetts Contingency Plan (MCP) Activities
- Tank Management
- Update on the environmental management plan

The chapter will also present a discussion of the following topics:

- Fuel spill prevention
- Future stormwater management improvements (if any)
- Future MCP and tank management activities

9. Project Mitigation Tracking

This chapter will report on the status of mitigation commitments for specific Massport and tenant projects at Logan Airport that have undergone Massachusetts Environmental Policy Act (MEPA) review and other commitments and have commenced construction. The mitigation commitments were made in the Section 61 Findings for the following projects will be reported:

- West Garage/Central Garage
- International Gateway
- Runway Ends 22R and 33L Safety Improvements
- Replacement Terminal A
- Logan Airside Improvements Planning
- Southwest Service Area Redevelopment Program

This chapter will update the status of Massport's mitigation commitments and also will identify projects for which mitigation is complete. Projects for which mitigation has been completed such as West Garage/Central Garage and Replacement Terminal A, will be noted but not described in detail.

<u>**Appendices**</u>
MEPA Documentation
These appendices will include a copy of the Secretary's Certificate and comment letters received on the *2009 EDR*. Individual responses to items raised in the Secretary's Certificate on the *2009 EDR* and comments in reviewers' letters will be provided. A distribution list for the *2010 EDR* (indicating those receiving documents or CDs) will be provided.

Supporting Technical Documentation
Supporting technical appendices will be provided as necessary.

D

Distribution

This *2009 Environmental Data Report* (*2009 EDR*) has been distributed to federal, state, and city agencies and to parties listed in this appendix. The list includes those entities that the Massachusetts Environmental Policy Act (MEPA) requires as part of the review of the document, representatives of governmental agencies, commenters on the *2008 EDR*, and community groups concerned with airport activities.

The *2009 EDR* also is available on Massport's website at www.massport.com and electronically on compact disc (CD). Limited CD or printed copies of the *2009 EDR* may be requested from Laurie Goodrich, Massport, Suite 200S, Logan Office Center, One Harborside Drive, East Boston, MA 02128, telephone (617) 568-3507, e-mail: lgoodrich@massport.com. Printed and electronic copies of this report are available for review at the following public libraries:

Table D-1 Libraries

	Library	Address		Library	Address
P,C	Boston Public Library Main Branch	666 Boylston Street Boston, MA 02117	P,C	Boston Public Library Charlestown Branch	179 Main Street Charlestown, MA 02129
P,C	Boston Public Library Connolly Branch	433 Centre Street Jamaica Plain, MA 02130	P,C	Boston Public Library East Boston Branch	276 Meridian Street East Boston, MA 02128
P,C	Boston Public Library Orient Heights Branch	18 Barnes Avenue East Boston, MA 02128	P,C	Boston Public Library South Boston Branch	646 East Broadway South Boston, MA 02127
P,C	Bedford Public Library	7 Mudge Way Bedford, MA 01730	P,C	Cary Memorial Library	1874 Massachusetts Avenue Lexington, MA 02420
P,C	Chelsea Public Library	569 Broadway Chelsea, MA 02150	P,C	Concord Public Library	129 Main Street Concord, MA 01742
P,C	Lincoln Public Library	Bedford Road Lincoln, MA 01773	P,C	Milton Public Library Main Branch	476 Canton Avenue Milton, MA 02186
P,C	Quincy Public Library Thomas Crane Branch	40 Washington Street Quincy, MA 02169	P,C	Revere Public Library	179 Beach Street Revere, MA 02151
P,C	Winthrop Public Library	One Metcalf Square Winthrop, MA 02151	P,C	State Transportation Library	10 Park Plaza Boston, MA 02116-3973
P,C	Medford Public Library	111 High St. Medford, MA 02155	P,C	Everett Public Library	410 Broadway Everett, MA 02149
P,C	Somerville Public Library	79 Highland Ave. Somerville, MA 02143	P,C	Cambridge Main Library	449 Broadway Cambridge, MA 02138

C CD sent
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Some parties listed in Table D-2 have been provided a hard copy of the document along with a CD of the complete document. A second group of parties have been provided with a CD only.

Table D-2 Distribution

Commentors on the *2008 EDR*

[P,C] Bryan Glascock Director City of Boston Environment Department Room 805 1 City Hall Plaza Boston, MA 02201	[P,C] Robert Healy City Manager City of Cambridge 795 Massachusetts Avenue Cambridge, MA 02139	[P,C] Nancy S. Timmerman, P.E. Consultant in Acoustics and Noise Control 25 Upton Street Boston, MA 02218
[P,C] Peter Koff Engel & Shultz, LLP. 265 Franklin Street, Suite 1801 Boston, MA 02110-2704	[P,C] Robert D'Amico Senior Planner Boston Transportation Department One City Hall, Room 721 Boston, MA 02201	[P,C] Jerome Falbo Town of Winthrop Noise, Air Pollution & Airport Hazards Committee Town Hall, 1 Metcalf Square Winthrop, MA 02152

Federal Government

- **United States Senators and Representatives**

[C] U.S. Representative Michael E. Capuano 110 First Street Cambridge, MA 02141	[C] U.S. Representative Niki Tsongas 11 Kearney Square Lowell, MA 01852	[C] U.S. Representative Barney Frank 29 Crafts Street Newton, MA 02158
[C] U.S. Representative William Delahunt 1250 Hancock Street, Suite 802-N Quincy, MA 02169	[C] U.S. Representative John Tierney 17 Peabody Square Peabody, MA 01960	[C] U.S. Senator Scott Brown 2400 J.F. Kennedy Federal Building Room 409 Boston, MA 02203
[C] U.S. Representative Edward J. Markey Five High Street, Suite 101 Medford, MA 02155	[C] U.S. Representative James McGovern 34 Mechanic Street, 1st Floor Worcester, MA 01608	[C] U.S. Senator John F. Kerry One Bowdoin Square, 10th Floor Boston, MA 02114
[C] U.S. Representative Steven Lynch 88 Black Falcon Terminal Suite 340 Boston, MA 02210		

- **Environmental Protection Agency**

[C] Elizabeth Higgins Congram Director, Office of Environmental Review U.S. Environmental Protection Agency New England Region 5 Post Office Square – Suite 100 Boston, MA 02109	[C] Lucy Edmondson Chief of Operations U.S. Environmental Protection Agency New England Region 5 Post Office Square – Suite 100 Boston, MA 02109	[C] Tim Timmerman U.S. Environmental Protection Agency New England Region 5 Post Office Square – Suite 100 Boston, MA 02109

Table D-2 Distribution (Continued)

Federal Aviation Administration

[C] Amy Corbett
New England Regional Administrator
Department of Transportation
Federal Aviation Administration
New England Region
12 New England Executive Park, Box 510
Burlington, MA 01803

[P,C] Richard Doucette
Manager, Environmental Programs
Department of Transportation
Federal Aviation Administration
New England Region
12 New England Executive Park, Box 510
Burlington, MA 01803

[C] Deborah James
Tower Manager
Department of Transportation
Federal Aviation Administration
Logan International Airport
600 Control Tower, 19th Floor
East Boston, MA 02128

[C] Ralph Nicosia-Rusin
Capacity Program Manager
Department of Transportation
Federal Aviation Administration
New England Region, Airports Division
12 New England Executive Park, Box 510
Burlington, MA 01803

[P,C] Laverne Reid
Manager, Airports Division
Department of Transportation
Federal Aviation Administration
New England Region, Airports Division
12 New England Executive Park, Box 510
Burlington, MA 01803

[C] Gary Hofnagle
Department of Transportation
Federal Aviation Administration
Boston Air Traffic Control Tower
Logan International Airport
600 Control Tower, 19th Floor
East Boston, MA 02128

United States Army Corps of Engineers

[C] Colonel Philip T. Feir
Division Engineer
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

United States Postal Service

[C] Dale Bierstaker
Support Services
United States Postal Service
GMF, Room 203
Boston, MA 02205-9991

United States Fish and Wildlife Service

[C] Dr. Mamie Parker
Assisting Regional Director
U.S. Fish and Wildlife Service
Department of the Interior
300 Westgate Center Drive
Hadley, MA 01035-9589

[C] NE Field Office
U.S. Fish and Wildlife Service
Department of the Interior
70 Commercial St., Suite 300
Concord, NH 03301-5087

State Government

Department of Environmental Protection

[C] Laurie Burt
Commissioner
Department of Environmental Protection
1 Winter St.
Boston, MA 02108

[C] Nancy Baker
MEPA Coordinator
Northeast Regional Office
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

[C] Rachel Freed
Section Chief
Wetlands and Waterways - NERO
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

[C] Iris Davis
Bureau of Waste Site Cleanup
Section Chief
Permits/Risk Reduction - NERO
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

[C] Jerome Grafe
Department of Environmental Protection – BWP
1 Winter Street, 10th Floor
Boston, MA 02108

[C] Christine Kirby
Transportation Programs
Department of Environmental Protection
One Winter Street, 9th Floor
Boston, MA 02108

Table D-2 Distribution (Continued)

Senate/House of Representatives

[C] Senate President Therese Murray
Massachusetts State House, Room 332
Boston, MA 02133

[C] Senator Steven Baddour
Massachusetts State House, Room 208
Boston, MA 02133

[C] Senator Sal DiDomenico
Massachusetts State House, Room 218
Boston, MA 02133

[C] Senator John A. Hart
Massachusetts State House, Room 109C
Boston, MA 02133

[C] Speaker of the House Robert A. DeLeo
Massachusetts State House, Room 356
Boston, MA 02133

[C] Representative Kathi-Anne Reinstein
Massachusetts State House, Room 171
Boston, MA 02133

[C] Representative Joseph C. Wagner
Massachusetts State House
Room 134
Boston, MA 02133

[C] Representative Martha Walz
Massachusetts State House, Room 473G
Boston, MA 02133

[C] Representative Brian Wallace
Massachusetts State House, Room 472
Boston, MA 02133

[C] Representative Eugene L. O'Flaherty
Massachusetts State House, Room 136
Boston, MA 02133

[C] Senator Anthony Petruccelli
Massachusetts State House, Room 413B
Boston, MA 02133

[C] Representative Carlo Basile
Massachusetts State House, Room 544
Boston, MA 02133

[C] Representative Byron Rushing
Massachusetts State House, Room 121
Boston, MA 02133

[C] Representative Charles Murphy
Massachusetts State House, Room 243
Boston, MA 02133

Executive Office of Energy and Environmental Affairs

[P,C] Ian Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge St, 9th Floor
Boston, MA 02114

[P,C] Alicia McDevitt
MEPA Director
Executive Office of Energy and Environmental Affairs
100 Cambridge St, 9th Floor
Boston, MA 02114

[P,C] Anne Canaday
Environmental Analyst
Executive Office of Energy and Environmental Affairs
100 Cambridge St, 9th Floor
Boston, MA 02114

Department of Public Health

[C] Suzanne K. Condon
Associate Commissioner
Executive Office of Health and Human Services
Attn: Margaret Round
Department of Public health
250 Washington Street
Boston, MA 02108

Department of Conservation and Recreation

[C] Rick Sullivann
Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114-2104

[C] Priscilla E Geiges, Director
Division of State Parks
Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114

Table D-2 Distribution (Continued)

- **Department of Fisheries, Wildlife and Environmental Law Enforcement**

[C] Environmental Reviewer
Mass. Wildlife &
Environmental Law Enforcement
Field Headquarters Rte. 135
Westborough, MA 01581

- **Department of Housing and Community Development**

[C] Debra Jean
Coordinator, State Clearinghouse
Department of Housing and Community Development
One Congress Street, Suite 1001
Boston, MA 02114-2023

- **Massachusetts Water Resources Authority**

[C] Frederick A. Laskey
Executive Director
Mass. Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Charlestown, MA 02129

- **Coastal Zone Management**

[C] Deerin Babb-Brott
Director
Massachusetts Office of Coastal Zone Management
EEA
251 Causeway St. Suite 900
Boston, MA 02114-2119

- **Central Transportation Planning Staff**

[C] Robin Mannion
Deputy Director, Modeling Activities
Central Transportation Planning Staff
10 Park Plaza, Room 2150
Boston, MA 02116

- **Metropolitan Area Planning Council**

[P,C] Joel Barrera
Deputy Executive Director
Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111

- **Massachusetts Department of Transportation (MassDOT)**

[C] Jeffrey B. Mullan
Secretary of Transportation, MassDOT
10 Park Plaza, Suite 3170
Boston, MA 02116

[C] Richard A. Davey
Administrator, MassDOT Rail & Transit
10 Park Plaza, Suite 3910
Boston, MA 02116

[C] Luisa Paiewonsky
Administrator, MassDOT Highway
10 Park Plaza, Suite 3510
Boston, MA 02116

[C] Christopher J. Willenborg
Administrator, MassDOT Aeronautics
Logan Office Center
One Harborside Drive
Suite 205N
East Boston, MA 02128-2909

[C] David Mohler
Executive Director
MassDOT Office of Transportation Planning
10 Park Plaza, Suite 4150
Boston, MA 02116

[C] Michael Trepanier
MEPA/NEPA Supervisor, MassDOT Highway
10 Park Plaza, Suite 4260
Boston, MA 02116

[C] Ronald Killian
Manager of Environmental Permits & Procedures, MassDOT
185 Kneeland Street, 9th floor
Boston, MA 02111

[C] Andrew Brennan
Director of Environmental Affairs, MBTA
10 Park Plaza, Suite 6720
Boston, MA 02116

Table D-2 Distribution (Continued)

- **Massachusetts Executive Office of Health and Human Services**

[C] Margaret Round, Environmental Analyst
Massachusetts Department of Public Health
Center for Environmental Health
250 Washington Street, 7th Floor
Boston, MA 02108

- **Massachusetts Department of Public Safety**

[C] Thomas G. Gatzunis
Commissioner
Massachusetts Department of Public Safety
One Ashburton Place
Boston, MA 02108

- **Massachusetts Port Authority Board of Directors**

[C] John A. Quelch
Board Chairman
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[C] Ranch C. Kimball,
Board Member
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[C] James A. Aloisi, Jr.
Board Member
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[C] Paul J. McNally
Board Member
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[C] Frederic Mulligan
Board Member
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

Municipalities

- **City of Boston**

Office of the Mayor

[C] Thomas Menino
Mayor
City of Boston
One City Hall Square
Boston, MA 02201

Boston Transportation Department

[P,C] Robert D'Amico
Senior Planner
Boston Transportation Department
One City Hall Plaza, Room 721
Boston, MA 02201

[P,C] Tom Tinlin
Commissioner
Boston Transportation Department
One City Hall Square, Room 721
Boston, MA 02201

Boston Redevelopment Authority

[P,C] John Palmieri
Director
Boston Redevelopment Authority
One City Hall Square, Room 959
Boston, MA 02201

Boston Parks and Recreation Department

[C] Antonia Pollak
Commissioner
Boston Parks and Recreation Department
1010 Massachusetts Avenue
Boston, MA 02118

Table D-2 Distribution (Continued)

City Clerk's Office

C Rosario Salerno
Boston City Clerk
One City Hall Square
Boston, MA 02201

Boston Public Health Commission

C Dr. Barbara Ferrer
Executive Director
Boston Public Health Commission
1010 Massachusetts Avenue
Boston, MA 02118

Boston Environment Department

C Maura Zlody
City of Boston Environment Department
One City Hall Plaza, Room 805
Boston, MA 02201

Environmental Services Cabinet

C Nancy Grilke
Environmental Services Cabinet Chief of Staff
City Hall, Room 603
Boston, MA 02201

C James Hunt
Chief of Environmental and Energy Services
City Hall, Room 603
Boston, MA 02201

Boston Water and Sewer Commission

C Vincent G. Mannering
Executive Director
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119

C John Lopes
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119

C Charlie Jewel
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119

Boston City Council

C Michael Ross
Council President
Boston City Council
Boston, City Hall
Boston, MA 02201

C Sal LaMattina
District Councilor, 1
Boston City Council
Boston City Hall
Boston, MA 02201

C Bill Linehan
District Councilor, 2
Boston City Council
Boston, City Hall
Boston, MA 02201

C Maureen E. Feeney,
District Councilor, 3
Boston City Council
Boston, City Hall
Boston, MA 02201

C Charles C. Yancey
District Councilor, 4
Boston City Council
Boston, City Hall
Boston, MA 02201

C Robert Consalvo
District Councilor, 5
Boston City Council
Boston City Hall
Boston, MA 02201

C John Tobin
District Councilor, 6
Boston City Council
Boston, City Hall
Boston, MA 02201

C Charles Turner
District Councilor, 7
Boston City Council
Boston, City Hall
Boston, MA 02201

C Mark Ciommo
District Councilor, 9
Boston City Council
Boston, City Hall
Boston, MA 02201

C Felix Arroyo
Councilor-At-Large
Boston City Council
Boston, City Hall
Boston, MA 02201

C Stephen J. Murphy
Councilor-At-Large
Boston City Council
Boston, City Hall
Boston, MA 02201

C Ayanna Pressley
Councilor-At-Large
Boston City Council
Boston, City Hall
Boston, MA 02201

Table D-2 Distribution (Continued)

C John Connolly
Councilor-At-Large
Boston City Council
Boston, City Hall
Boston, MA 02201

- **Town of Milton**

C Marion McEttrick.
Chair, Board of Selectmen
Milton Town Hall
1475 Canton Avenue
Milton, MA 02186

C Kevin Mearn
Town Administrator
Milton Town Hall
525 Canton Avenue
Milton, MA 02186

- **City of Chelsea**

C Jay Ash
City Manager
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

C Anthony Pellegrino
Councilor District 7
500 Broadway
Chelsea, MA 02150

C Daniel Cortell
Councilor District 8
500 Broadway
Chelsea, MA 02150

C Deborah Clayman
City Clerk
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

C Leo Robinson
Council President
500 Broadway
Chelsea, MA 02150

C Stephen Sarikas, Chairman
Chelsea Conservation Commission
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

C Paula S. Barton
Councilor District 4
500 Broadway
Chelsea, MA 02150

C Richard Maronski
Councilor District 3
500 Broadway
Chelsea, MA 02150

C Roseann T. Bongiovanni
Councilor-At-Large
500 Broadway
Chelsea, MA 02150

C Brian B. Hatleberg
Councilor District 5
Chelsea City Hall
500 Broadway
Chelsea, MA 02170

C Mike MeKonnen Tsegaye
Councilor District 2
500 Broadway
Chelsea, MA 02150

C John DePriest
Chelsea Conservation Commission
City of Chelsea
500 Broadway, Room 101
Chelsea, MA 02150

C Marilyn Vega-Torres
Councilor District 6
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

C Luis Prado, MSPIH
Director, Department of Health and Human Services
Chelsea City hall
500 Broadway
Chelsea, MA 02150

C Kathleen Bishop
Councilor District 1
500 Broadway
Chelsea, MA 02150

C Calvin T. Brown
Councilor-At-Large
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

Table D-2 Distribution (Continued)

- **City of Quincy**

C Thomas Koch
Mayor
Quincy City Hall
1305 Hancock Street
Quincy, MA 02169

C Kevin F. Coughlin
President, City Council
Quincy City Hall
1305 Hancock Street
Quincy, MA 02169

C Joseph Shea
City Clerk
Quincy City Hall
1305 Hancock Street
Quincy, MA 02169

- **City of Revere**

C Thomas G. Ambrosino Jr., Mayor
Revere City Hall
281 Broadway
Revere, MA 02151

C Ashley Melnik, City Clerk
Revere City Hall
281 Broadway
Revere, MA 02151

- **Town of Winthrop**

C James McKenna
Town Manager
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Richard Dimes
Winthrop Planning Board
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Jerome Falbo
Town of Winthrop Air Pollution, Noise and Airport Hazards Committee
80 Jefferson Street
Winthrop, MA 02152

C Mary Kelley Chair,
Winthrop Conservation Commission
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Jeffrey Rosario Turco
Council President
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Phillip Boncore
Councilor-At-Large
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C J. Larry Powers
V.P., Councilor-At-Large
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Paul Varone
Councilor- Precinct 1
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C James Letterie
Councilor- Precinct 2
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Nicholas DelVento
Councilor- Precinct 3
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Jeanne Maggio
Councilor- Precinct 4
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Russell Sanford
Councilor- Precinct 5
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

C Linda Calla
Councilor- Precinct 6
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

- **Town of Bedford**

C Michael Rosenberg, Chair
Board of Selectmen
Town of Bedford
10 Mudge Way
Bedford, MA 01730

C Richard T. Reed
Town Manager
Town of Bedford
10 Mudge Way
Bedford, MA 01730

Table D-2 Distribution (Continued)

- **Town of Lexington**

C Jeanne Krieger Board of Selectmen Lexington Town Hall 1625 Massachusetts Avenue Lexington, MA 02173	C Hank Manz Board of Selectmen, HFAC Rep. Lexington Town Hall 1625 Massachusetts Avenue Lexington, MA 02173	C Carl Valente Town Manager Lexington Town Hall 1625 Massachusetts Avenue Lexington, MA 02173

- **Town of Concord**

C Anne D. Shapiro Concord Board of Selectmen 34 Tarbell Spring Road Concord, MA 01742	C Christopher Whelan Town Manager Town of Concord 22 Monument Square Concord, MA 01742	C Jeffrey S. Wieand Concord Board of Selectman, Chair 22 Monument Square Concord, MA 01742

- **Town of Lincoln**

C Timothy Higgins Town Administrator Town Hall 16 Lincoln Road Lincoln, MA 01773	C Gary A. Taylor Board of Selectmen, Chair Town Hall 16 Lincoln Road Lincoln, MA 01773	C Sara Mattes Board of Selectmen,, HATS Chair Town Hall 16 Lincoln Road Lincoln, MA 01773

- **Town of Hull**

C Domenico Sestito Hull Board of Selectman, Town Hall 253 Atlantic Avenue Hull, MA 02045	C Phillip Lemnois Town Manager 253 Atlantic Avenue Hull, MA 02045	

- **City of Cambridge**

C Susan Glazer Acting City Manager-Community Development 344 Broadway Cambridge, MA 02139	C Robert W. Healy, City Manager Cambridge City Hall 795 Massachusetts Avenue Cambridge, MA 02139	C Planning Board Cambridge City Hall 795 Massachusetts Avenue Cambridge, MA 02139

- **City of Somerville**

C Monica Lamboy Executive Director, Community Development 93 Highland Avenue Somerville, MA 02143	C Joseph A. Curtatone Mayor-City of Somerville 93 Highland Avenue Somerville, MA 02143	C Planning Board City of Somerville 93 Highland Avenue Somerville, MA 02143

- **City of Everett**

C Office of Community Development City Hall-Room 39 484 Broadway Everett, MA 02149	C Carlo DeMaria, Jr, Mayor Everett City Hall 484 Broadway Everett, MA 02149	C Planning Board Everett City Hall 484 Broadway Everett, MA 02149

- **City of Medford**

C Lauren DiLorenzo Director of Community Development 85 George Hassett Drive, Room 308 Medford, MA 02155	C Michael J. McGlynn, Mayor Medford City Hall 85 George P. Hassett Drive, Room 202 Medford, MA 02155	C Planning Board Medford City Hall 85 George P. Hassett Drive Medford, MA 02155

Table D-2 Distribution (Continued)

Community Groups and Interested Parties

- **Citizens Advisory Committee (CAC)**

C Gary Banks 128 Indian Trail Scituate, MA 02066	C Declan Boland 338 Main Street Hingham, MA 02043	C James Bowen 385 Meridien Street East Boston, MA 02128
C Charles R. Borgioli 84 Banks Road Swampscott, MA 01907-2047	C Frank Chin 171 Tremont Street Boston, MA 02111	C Frank Ciano 65 Woodside Lane Arlington, MA 02474
C Larry Costello 100 Furbush Road West Roxbury, MA 02132	C Bill Deignan City of Cambridge Planning Department 344 Broadway Cambridge, MA 02139	C Ralph Dormitzer 111 Atlantic Avenue Cohasset, MA 02025
C Bob Driscoll 179 Grovers Avenue Winthop, MA 02152	C Jerome Falbo 80 Jefferson Street Winthrop, MA 02152	C Patti Fine 25 Sackville Street Charlestown, MA 02129
C MaryAnn Frye 2 Beach Lane Hingham, MA 02043	C Alex Geourntas 39 Iona Street Roslindale, MA 02131	C David Godine 196 School Street Milton, MA 02186
C Ron Hardaway 118 Bayswater Street East Boston, MA 02128	C Rod Hobson 31 Deep Run Cohasset, MA 02025	C Judith Kennedy 170 Atherton Street Milton, MA 02186
C Sandra Kunz 89 Hollingsworth Avenue Braintree, MA 02184	C Ben Leone 245 Bellingham Avenue Revere, MA 02151	C Michael Lindstrom Melrose City Hall, 562 Main Street Melrose, MA 02176
C Anastasia Lyman 18 Greenough Avenue Jamaica Plain, MA 02130	C Will Lyman 18 Greenough Avenue Jamaica Plain, MA 02130	C James MacDonald 29 Arlington Road Dedham, MA 02026
C Matt MacIver 29 Green Street Hingham, MA 02043	C Bernice Mader 108 Connell Street Quincy, MA 02169	C Russ Maguire 125 Access Norwood, MA 02062
C Terry McAteer 266 Pine Street South Weymouth, MA 02190	C Paul Meleedy 63 Montgomery Street Lakeville, MA 02347	C Jillian Middleton 85 Little Nahant Road Nahant, MA 01908
C Endri Misho 25 Golden Avenue Medford, MA 02155	C Joseph Moccia 73 Little Nahant Road Nahant, MA 01908	C Dick Morrison Morrison Market Strategies 34 Tremont Street Chelsea, MA 02150
C David Nagle 711 East Second Street South Boston, MA 02127	C Martin Nee 109 Atlantic Avenue Cohasset, MA 02025	C Michael Parker 160 Federal Steet Boston, MA 02110

Table D-2 Distribution (Continued)

[C] Darryl Pomicter
136 Myrtle Street
Boston, MA 02114

[C] Susan Rasmussen
Cambridge Planning Department
344 Broadway
Cambridge, MA 02139

[C] Yelena Shulkina
8 Ninth Street, Unit 64
Medford, MA 02155

[C] Rodney Singleton
44 Cedar Street
Roxbury, MA 02119

[C] Pamela Smith
641 Adams St
Dorchester, MA 02122

[C] John Stewart
37 Greenwich Park
Boston, MA 02118

[C] Allison Stieber
14 Wyatt Street
Somerville, MA 02143

[C] William Sweeney
79 Chestnut Road
Halifax, MA 02338

[C] Mona Thaler
22 Cushing Road
Brookline, MA 02146

[C] Jonathan Walzer
864 South River Street
Marshfield, MA 02050

[C] Jeffrey Weeden
107 Gardiner Street
Lynn, MA 01905

[C] Leo White
12 Stewart Lane
Beverly, MA 01915-1112

[C] Jonathan Witten
156 Duck Hill Road
Duxbury, MA 02332

[C] Alan Wright
57 Arborough Road
Roslindale, MA 02131

[C] Wig Zamore
13 Highland Avenue #3
Somerville, MA 02143

- **Charlestown Community**

[C] Tom Cunha
Chairman
Charlestown Neighborhood Council
427 Bunker Hill Street
Charlestown, MA 02129

[C] Dave Whelan
First Vice Chairman
23 Ferrin Street
Charlestown, MA 02129

[C] Jack Kelly
Mayor's Office of Neighborhood Services
1 City Hall Square, Room 708
Boston, MA 02201

- **Chelsea Community**

[C] Juan Vega
Executive Director
Centro Latino de Chelsea
267 Broadway
Chelsea, MA 02150

[C] Gladys Vega
Chelsea Collaborative
318 Broadway
Chelsea, MA 02150

[C] Charlene Bauer
President
Chelsea Rotary
8 Central Avenue
Chelsea, MA 02150

[C] William Hart
President
Chelsea Chamber of Commerce
308 Broadway
Chelsea, MA 02150

Table D-2 Distribution (Continued)

Jamaica Plain Community

C Nancy Brooks and Maura Meagher
92 Bourne St
Jamaica Plain, MA 02130

C Marvin Kabakott
98 Bourne St
Jamaica Plain, MA 02130

C Martha Merson
19 Roseway St
Jamaica Plain, MA 02130

C Susan Morony
33 Bournedale Rd
Jamaica Plain, MA 02130

C Robyn Ochs
79 Eastland Road
Jamaica Plain, MA 02130

C Craig Sonnenberg
Aircraft Noise Action Committee
18 Southborne Road
Jamaica Plain, MA 02130

East Boston Community

C Thomas Briand, President
East Boston Residents &
Homeowners Assoc.
83 Byron Street
East Boston, MA 02128

C Karen Buttiglieri
56 Beachview Road
East Boston, MA 02128

C John Dudley
Executive Director
East Boston Chamber of Commerce
296 Bennington Street
East Boston, MA 02128

C Mary Catino
71 Liverpool Street
East Boston, MA 02128

C Debra Cave
ONE East Boston
106 White Street
East Boston, MA 02128

C Alice Christopher
972 Bennington Street
East Boston, MA 02128

C Dean Hashimoto
East Boston Neighborhood Health Center
153 Westchester Road
Newton, MA 02158

C Lucy Ferullo
23 Haynes Street
East Boston, MA 02128

C Tom Bruno
Orient Heights Neighborhood Association
21 Annavoy Street
East Boston, MA 02128

C Mary Ellen Welch
East Boston Greenways
225 Webster Street
East Boston, MA 02128

C Roberta Horn
65 St. Andrews Road
East Boston, MA 02128

C Ida Lamattina
President
Gove Street Citizens Committee
123 Cottage Street
East Boston, MA 02128

C Blossom Hoag
177 Webster Street
East Boston, MA 02128

C George Loring
Bremen Street Park Site Committee
237 Marion Street
East Boston, MA 02128

C Karen Maddalena
Chairperson
Jeffries Point Neighborhood Assoc.
4 Lamson Street
East Boston, MA 02128

C James Manganello, Executive Director
East Boston Community Information &
Referral Center
237 Marion Street
East Boston, MA 02128

C Richard Lynds
Executive Director,
East Boston Foundation
46 Bennington Street
East Boston, MA 02128

C Clark Moulaison
East Boston Main Streets
146 Maverick Street
East Boston, MA 02128

C Ron Hardaway
118 Bayswater Street
East Boston, MA 02128

C Gail Miller
232 Orient Ave
East Boston, MA 02128

C Jack Scalcione
Commander, East Boston Veteran's Council
36 Frankfort Street
East Boston, MA 02128

Table D-2 Distribution (Continued)

[C] Bill Manning 1 Webster Street East Boston, MA 02128	[C] Fran Riley 193 Trenton Street East Boston, MA 02128	[C] Fran Rowan 7 Thurston Street East Boston, MA 02128
[C] Ernani DeAraujo Mayor's Office of Neighborhood Services Boston City Hall, Room 205 Boston, MA 02201	[C] Richard Salini, Chair East Boston Piers PAC 155 Webster Street East Boston, MA 02128	[C] Diane Modica 24 Haynes Street East Boston, MA 02128
[C] Robert Verdonk, President East Boston Savings Bank 10 Meridian Street East Boston, MA 02128	[C] Vincent R. Tino 95 Faywood Avenue East Boston, MA 02128	[C] Maria Conti Secretary, EB Piers PAC 44 Saratoga Street East Boston, MA 02128
[C] Commodore Jeffries Yacht Club 565 Summer Street East Boston, MA 02128	[C] John Cradock East Boston Neighborhood Health Center 10 Gove Street East Boston, MA 02128	[C] John Kelly East Boston Social Centers 68 Central Sq. East Boston, MA 02128
[C] Joe Mason East Boston Land Use Council 2 Neptune Road, Suite 352 East Boston, MA 02128	[C] Mary Berninger 156 St. Andrew Road East Boston, MA 02128	c David Arinella 20 Thurston Street East Boston, MA 02128
[C] Fran Carbone 174 Bayswater Street East Boston, MA 02128		
■ **Revere Community**		
[C] Mr. John Addonizio Board Director Revere Chamber of Commerce Fleet National Bank 330 Broadway Revere, MA 02151	[C] Michael Callahan 265 Crescent Avenue Revere, MA 02151	[C] James Furlong Roughans Point Association c/o 12 Pierview Street Revere, MA 02151
[C] Elaine Hurley Pines Riverside Association c/o 21 River Avenue Revere, MA 02151	[C] Joseph James Friends of Rumney Marsh 10 Rice Avenue Revere, MA 02151	[C] Michael Kelleher Revere Beach Assoc. 681 Revere Beach Boulevard Revere, MA 02151
[C] Sheldon Kovitz, President Point of Pines Beach Assoc. c/o 53 Delano Avenue Revere, MA 02151	[C] Rose LaQuaglia Oak Island Civic Association 5 Oak Island Road Revere, MA 02151	[C] Carl Shalachman 72 Whitin Ave Revere, MA 02151
[C] John J. Verrengia President, Revere Chamber of Commerce 385 Broadway Revere, MA 02151	[C] Joseph Felzani 42 Goodwin Ave Point of Pines Revere, MA 02151	[C] Jim Page 162 Endicott Avenue Revere, MA 02151

Table D-2 Distribution (Continued)

■ Roslindale Community

C Pauline Sickels-George
50 Halliday St
Roslindale, MA 02131

■ South Boston Community

C Thomas McGrath
President-South Boston Citizens Association
574 E Eighth St
South Boston, MA 02127

C Casey Hines
Mayor's Office of Neighborhood Services
1 City Hall Plaza
Boston, MA 02201

C Lucky Devlin
South Boston Environmental & Health Coalition
718 East Second Street
South Boston, MA 02127

C Timothy Hayes, Chair
"M" Street Park Association
23 M Street
South Boston, MA 02127

C Alice O'Leary
Publisher, South Boston Tribune
395 West Broadway
South Boston, MA 02127

C Seaport Alliance for a Neighborhood Design
300 Summer Street
Boston, MA 02210

C Mr. William Spain
President
Castle Island Association
1514 Columbia Road
South Boston, MA 02127

■ Winthrop Community

C Eleanor Casey
308 Bowdoin Street
Winthrop, MA 02152

C Richard D. Dimes
Winthrop Hazards Committee
105 Johnson Ave.
Winthrop, MA 02152

C Ellizabeth Regan, President
Friends of Belle Isle Marsh
P.O. Box 575
East Boston, MA 02128

C Tony Marmo
President
North Shore Recreation Center
40 River Road
Winthrop, MA 01252

C Holly Citroni-DeAngelis
Treasurer
Winthrop Chamber of Commerce
207 Hagman Road
Winthrop, MA 02152

C Eric Gaynor
Executive Director
Winthrop Chamber of Commerce
207 Hagman Road
Winthrop, MA 02152

C Robert Pulsifer
1050 Shirley Street
Winthrop, MA 02152

C Cindy Levins, Vice President
Winthrop Chamber of Commerce
207 Hagman Road
Winthrop, MA 02152

C Marie Turner
283 Court Road
Winthrop, MA 02152

C John Vitagliano
19 Seymour Street
Winthrop, MA 02152

■ West Roxbury Community

C Larry Boran
40 Vershire Street
West Roxbury, MA 02132

C Carl Corcy
88 Bellevue Street
West Roxbury, MA 02132

C Keith Davison
37 Hastings Street, #206-ME
West Roxbury, MA 02132

Table D-2 Distribution (Continued)

■ **Other Communities**

[C] Marianne McCabe
3 Webster Square
PMB 333
Marshfield, MA 02050

[C] Daniel McCormack
Weymouth Town Hall (Health Department)
75 Middle Street
Weymouth, MA 02189

[C] Kristen O'Brien
45 Badger Circle
Milton, MA 02186

[C] John Yaney
81 West Street
Whitman, MA 02382

[C] Dovi Abbey
4 Humboldt Avenue
Roxbury, MA 02119

[C] Ron Fama
11 St. Anne Road
Weymouth, MA 02189

■ **Organizations and Other Interested Parties**

[C] Association for Public Transportation, Inc.
P.O. Box 51029
Boston, MA 02205-1029

[C] Lauren Adair
Metro Area Planning Commission
60 Temple Place, Fl. 6
Boston, MA 02111

[C] Valerie Burns
Director
Boston Natural Areas Network, Inc.
62 Sumner Street, 2nd Floor
Boston, MA 02110-1008

[C] John E. Drew
President, Drew Company, Inc.
2 Seaport Lane, 9th Floor
Boston, MA 02210

[C] Ross B. Capon
National Assoc. of Railroad Passengers
900 Second Street, Suite 308
Washington, DC 20002-3557

[C] Jay Walsh
Director
Mayor's Office of Neighborhood Services
1 City Hall Plaza
Boston, MA 02201

[C] Bruce A. Egan,
President, Egan Environmental, Inc.
75 Lothrop Street
Beverly, MA 01915

[C] K. Dun Gifford, President
Comm. for Regional Transportation
15 Hilliard
Cambridge, MA 02138

[C] Richard Kennelly, Jr.
Conservation Law Foundation
62 Summer Street
Boston, MA 02116

[C] Peter L. Koff, Esquire
Engel & Schultz, LLP
265 Franklin Street, Suite 1801
Boston, MA 02110

[C] Amanda Veinotte
Natural Heritage and Endangered Species Program
1 Rabbit Hill Road
Westboro, MA 01581

[C] Nancy Lancellotti
Central Artery/Tunnel Project
185 Kneeland Street
Boston, MA 02111

[C] Donald MacIver
Massachusetts Association of Conservation Commissions
10 Juniper Road
Belmont, MA 02178

[C] James Bryan McCaffrey
Executive Director, Sierra Club
10 Milk Street
Suite 632
Boston, MA 02108-4621

[C] Ann McGahan
CTPS
10 Park Plaza, Suite 2150
Boston, MA 02116

[C] Executive Director
New England Council
98 North Washington Street
Boston, MA 02199

[C] Mystic River Watershed Association
200 Academy Street
Suite 203
Arlington, MA 02476

[C] Joseph W. Nigro, Jr.
General Agent/Secretary
Building and Construction Trades Council of the Metropolitan District
645 Morrissey Boulevard, Suite 2
Boston, MA 02122-3520

[C] E. Heidi Roddis
Massachusetts Audubon Society
208 South Great Road
Lincoln, MA 01773

[C] Dennis Begany
5 Bakers Avenue
Apt. 15
Boston, MA 02113

[C] President and CEO
Associated Industries of Mass.
222 Berkeley Street
P.O. Box 763
Boston, MA 02117-0763

Table D-2 Distribution (Continued)

C Jamy Madeja Buchanan & Associates 33 Mount Vernon Street Boston, MA 02128	C Bruce Berman Save the Harbor/Save the Bay Boston Fish Pier 212 Northern Avenue, Suite 304 West Boston, MA 02210	C Mike Bahtiarian Noise Control Engineering 799 Middlesex Turnpike Billerica, MA 02821
C MAPC MetroFuture Steering Committee 60 Temple Place Boston, MA 02111	C Somerville Transportation Equity Partnership 51 Mt. Vernon St. Somerville 02145	C Mystic View Task Force PO Box 441979 Somerville, MA 02144
C Sandra Kunz - CAC President Logan Airport CAC (Noise Study) 89 Hollingsworth Avenue Braintree, MA 02184	C Darrin McAuliffe Manager-Secretary, Rider Oversight Committee 45 High Street Boston, MA 02110	

C CD sent
P Printed volume sent

Technical Appendices

- Appendix E – Activity Levels
- Appendix F – Regional Transportation Context
- Appendix G – Ground Transportation
- Appendix H – Noise Abatement
- Appendix I – Air Quality/Emissions Reduction
- Appendix J – Water Quality/Environmental Compliance and Management
- Appendix K – 2009 Peak Period Pricing Monitoring Report
- Appendix L – Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations

E

Activity Levels

This appendix provides detailed tables in support of *Chapter 2, Activity Levels*:

Table E-1 Logan Airport Historic Air Passenger and Operations Data

Year	Operations	Air Passengers	Year	Operations	Air Passengers
1980	258,167	14,722,363	1995	466,327	24,192,095
1981	251,961	14,827,684	1996	456,226	25,134,826
1982	244,468	15,867,722	1997	482,542	25,567,888
1983	288,956	17,848,797	1998	507,449	26,526,708
1984	318,959	19,417,971	1999	494,816	27,052,078
1985	349,518	20,448,424	2000	487,996	27,726,833
1986	363,995	21,862,718	2001	463,125	24,474,930
1987	414,968	23,369,002	2002	392,079	22,696,141
1988	407,479	23,732,959	2003	373,304	22,791,169
1989	388,797	22,272,860	2004	405,258	26,142,516
1990	424,568	22,878,191	2005	409,066	27,087,905
1991	430,403	21,450,143	2006	406,119	27,725,443
1992	474,378	22,723,138	2007	399,537	28,102,455
1993	493,093	23,579,726	2008	371,604	26,102,651
1994	458,623	24,468,178	2009	345,306	25,512,086

Figure E-1 Logan Airport Historic Air Passenger and Operations Data

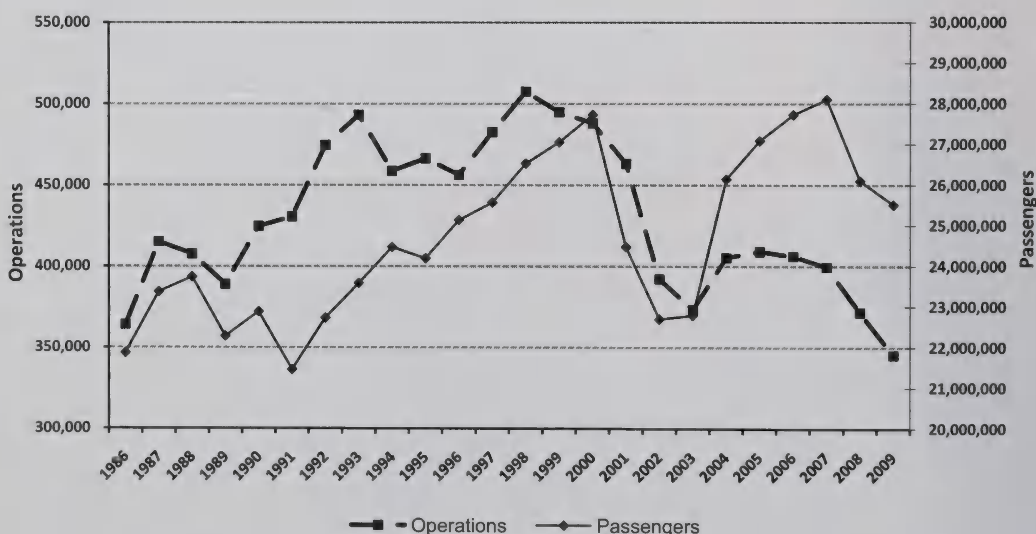


Table E-2 Logan Airport Changes in Domestic Passenger Operations by Carrier

Airline	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Scheduled Jet Carriers	193,599	190,991	199,281	198,879	189,739	184,181	-5,558	-2.93%
AirTran Airlines	12,618	14,580	19,761	18,685	14,665	13,645	-1,020	-6.96%
Alaska Airlines	1,111	1,088	1,097	1,423	1,969	1,818	-151	-7.67%
America West Airlines	5,922	4,467	4,220	2,874			-	-
American Airlines	32,578	27,712	24,631	23,589	22,827	22,766	-61	-0.27%
American Trans Air	2,342	2,294					-	-
Continental Airlines	13,575	13,546	13,972	14,090	13,930	11,823	-2,107	-15.13%
Delta Air Lines Mainline	15,279	14,317	18,472	21,799	19,977	17,170	-2,807	-14.05%
Delta Shuttle	10,237	9,588	9,000	9,114	8,915	7,179	-1,736	-19.47%
Delta Song	11,693	12,483	4,408				-	-
Delta Subtotal	37,209	36,388	31,880	30,913	28,892	24,349	-4,543	-15.72%
Independence Air	5,533	4,676	45				-	-
JetBlue	9,080	15,069	31,993	34,933	36,887	38,146	1,259	3.41%
Midwest Express / Frontier	2,851	3,570	4,287	4,672	4,070	1,723	-2,347	-57.67%
Northwest Airlines	11,242	9,685	8,652	8,368	7,931	7,745	-186	-2.35%
Southwest Airlines						2,602	2,602	-
Spirit Airlines			683	1,796	1,902	1,942	40	2.10%
Sun Country						254	254	-
United Airlines	20,975	18,304	21,153	20,140	18,568	17,531	-1,037	-5.58%
US Airways	38,563	39,612	36,907	37,396	38,098	36,466	-1,632	-4.28%
Virgin America						3,371	3,371	-
Regional/Commuter Carriers	132,276	139,208	132,304	126,021	112,881	107,615	-5,266	-4.67%
ACJet (Delta Connection)	7,244						-	-
ACJet (United Express)	1,442						-	-
Air Wisconsin (United Express)	801	1,699					-	-
Air Wisconsin (US Airways Express)		174	1,381	7,289	7,551	7,590	39	0.52%
Allegheny (US Airways Express)	1,789						-	-
American Eagle Airlines	42,173	37,394	31,227	23,638	19,561	18,665	-896	-4.58%
Atlantic SE (Delta Connection)	362			182	118	162	44	37.29%
Big Sky Airlines				6,929	173		-173	-100.00%
Cape Air	24,816	25,018	27,278	26,546	33,806	36,670	2,864	8.47%
Chautauqua Airlines (American Airlines)	1,533						-	-
Chautauqua Airlines (Continental Express)					152	106	-46	-30.26%

Table E-2 Logan Airport Changes in Domestic Passenger Operations by Carrier (Continued)

Airline	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Chautauqua Airlines (Delta Connection)	2,116	1,938	1,882	2,187	2,309	1,811	-498	-21.57%
Chautauqua Airlines (United Express)		103		484	598	642	44	7.36%
Chautauqua Airlines (US Airways Express)	8,899	7,852	8,954	3,117	907	1,597	690	76.07%
Colgan Air (Continental Connection)					23	1,289	1,266	5504.35%
Colgan Air (US Airways Express)	11,546	12,583	13,088	14,004	11,906	8,368	-3,538	-29.72%
Comair Airlines (Delta Connection)	15,732	24,619	26,341	27,196	23,130	16,576	-6,554	-28.34%
Commutair (Continental Express)	6,256	12,544	8,297	2,843			-	-
Compass Airlines (Northwest Airlink)					1,631	2,384	753	46.17%
Freedom Airlines				610	1,467		-1,467	-100.00%
Freedom Airlines (Delta Connection)						16	16	-
Mesa Airlines (Signature)			8				-	-
Mesa Airlines (United Express)	145	1,376	3,806	2,348	989	797	-192	-19.41%
Mesa Airlines (US Airways Express)	401	4	8	72			-	-
MidAtlantic Express	380	150	130	40			-	-
Piedmont Airlines (US Airways Express)	1,529	3,165	2,870	1,496	1,327	1,117	-210	-15.83%
Pinnacle Airlines (Delta Connection)					117	124	7	5.98%
Pinnacle Airlines (Northwest Airlink)	1,300	5,034	3,912	3,547	2,208	2,217	9	0.41%
PSA (US Airways Express)		526	246	109	2	2	0	0.00%
Republic						1,729	1,729	-
Republic (Midwest Express)					244		-244	-100.00%
Republic (US Airways Express)		46	260	731	4,523	3,168	-1,355	-29.96%
Shuttle America (Delta)				646	139	2,406	2,267	1630.94%
Shuttle America (United Express)						179	179	-
Trans States Airlines (United Express)	52		610				-	-
Trans States Airlines (US Airways Express)	1,756	2,978					-	-
Non-Scheduled Operations (Incl. Charter)	423	325	369	570	582	412	-170	-29.21%
Business Jet Solutions					62	162	100	161.29%
Champion Air		21	56	68	48		-48	-100.00%
Gold Transportation				58	40		-40	-100.00%
Miami Air	34	30	52	94	84	81	-3	-3.57%
North American Airways	216	148	92	81	6	9	3	50.00%
Other Nonscheduled Carriers	173	126	169	269	342	160	-182	-53.22%
Total Domestic Operations	326,298	330,524	331,954	325,470	303,202	292,208	-10,994	-3.63%

Table E-3 Logan Airport Changes in International Passenger Operations by Carrier

Airline	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Scheduled Jet Carriers	25,565	24,550	22,081	22,834	22,768	22,065	-703	-3.09%
Aer Lingus Shannon	1,096	1,016	1,020	1,221	1,347	1,268	-79	-5.86%
Aeromexico	649	534	210	131			-	-
Air Canada	6,846	5,782	3,950	3,377	3,215	2,988	-227	-7.06%
Air France	1,362	1,334	1,207	957	902	911	9	1.00%
Air Jamaica	662	349					-	-
Air One					140		-140	-100.00%
Alitalia	894	986	810	886	667	638	-29	-4.35%
American Airlines	5,175	4,672	4,824	4,700	4,115	3,167	-948	-23.04%
British Airways	2,080	2,151	2,190	2,160	2,134	2,116	-18	-0.84%
Delta Air Lines	736	749	851	829	848	781	-67	-7.90%
Finnair		44	49	66	48	47	-1	-2.08%
FlyGlobespan				225			-	-
Iberia Airlines				304	466	500	34	7.30%
Icelandair	892	811	807	869	821	777	-44	-5.36%
JetBlue			555	1,363	1,839	2,293	454	24.69%
Lufthansa German Airlines		1,564	1,522	1,515	1,667	1,722	55	3.30%
Northwest Airlines	730	727	734	1,081	1,438	1,154	-284	-19.75%
SATA International Airlines	301	315	334	393	360	372	12	3.33%
SWISS International (formerly Swiss Air)	714	704	708	727	722	664	-58	-8.03%
TACA	363	327	236				-	-
TACV - Cabo Verde	157	154	139	165	154	210	56	36.36%
US Airways	2,048	1,607	1,208	1,133	1,155	1,722	567	49.09%
Virgin Atlantic Airways	860	724	727	732	730	735	5	0.68%

Table E-3	Logan Airport Changes in International Passenger Operations by Carrier							
Airline	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Regional/Commuter Carriers	11,784	13,112	12,922	15,474	12,770	11,813	-957	-7.49%
ACJet (Delta Connection)	1,688						-	-
Air Canada Regional	5,060	5,120	7,676	8,499	8,478	7,542	-936	-11.04%
American Eagle Airlines	3,306	4,637	2,712	3,312	3,311	2,783	-528	-15.95%
Big Sky Airlines				1,468				
Comair Airlines (Delta Connection)	1,730	3,355	2,534	2,195	981	865	-116	-11.82%
Porter Airlines						615	615	-
Provincial Airlines						8	8	-
Non-Scheduled Operations	1,187	981	727	527	375	320	-55	-14.67%
ATA Airlines (formerly American Trans Air)	114	26	6	6			-	-
Aviation Technology		160					-	-
Empresa Peru						110	110	-
Miami Air	14	18	63	232	138	115	-23	-16.67%
North American Airways	441	323	275	112	8		-8	-100.00%
Pan American Airways	389						-	-
Ryan International	115	303	143				-	-
XTRA Aviation			145	103			-	-
Other Nonscheduled Carriers	114	151	95	74	229	95	-134	-58.52%
Total International Operations	38,536	38,643	35,730	38,835	35,913	34,198	-1,715	-4.78%

Source: Massport

Note: Both jet carriers and regional/commuter carriers scheduled and operated regional jet flights at Logan Airport in 2004-2007.

Table E-4	Logan Airport Scheduled Passenger Departures by Destination								
Destination Airport	Code	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Domestic		166,212	165,849	168,262	165,373	154,099	149,002	-5,098	-3.31%
New York La Guardia	LGA	13,709	13,368	12,619	12,579	12,287	11,574	-714	-5.81%
Washington National	DCA	10,572	10,697	9,587	9,594	9,242	9,597	355	3.84%
New York JFK	JFK	4,070	4,981	8,839	8,473	7,905	8,103	198	2.50%
Chicago O'Hare	ORD	8,446	7,421	7,251	7,422	7,134	7,092	-42	-0.58%
Atlanta	ATL	5,194	6,016	5,742	5,777	5,987	6,104	117	1.95%
Philadelphia	PHL	8,942	7,021	7,107	6,442	6,968	5,960	-1,008	-14.47%
Baltimore	BWI	5,281	5,033	6,787	5,820	4,910	4,999	90	1.82%
Washington Dulles	IAD	6,201	6,155	6,803	5,417	4,507	4,386	-122	-2.70%
Raleigh/Durham	RDU	4,106	4,115	5,054	4,322	4,053	4,232	179	4.42%
New York Newark	EWR	5,612	5,633	5,598	4,278	3,993	3,717	-276	-6.92%
Charlotte	CLT	2,928	3,292	3,171	3,434	3,576	3,703	127	3.54%
San Francisco	SFO	3,083	2,593	2,179	2,619	2,650	3,370	720	27.15%
Nantucket	ACK	4,406	3,445	3,619	3,501	3,837	3,336	-502	-13.07%
Los Angeles	LAX	3,374	2,658	2,667	2,798	2,288	3,259	971	42.46%
Orlando	MCO	3,673	3,528	3,084	3,673	3,411	3,094	-317	-9.28%
Dallas/Fort Worth	DFW	4,362	3,545	3,445	3,155	3,061	2,917	-144	-4.71%
Martha's Vineyard		3,304	2,227	2,610	2,557	2,765	2,670	-95	-3.45%
Buffalo	BUF	1,329	1,226	2,096	2,994	2,388	2,327	-60	-2.53%
Detroit	DTW	2,907	2,832	2,888	2,850	2,391	2,322	-68	-2.86%
Pittsburgh	PIT	2,139	2,023	2,058	2,183	2,464	2,213	-251	-10.17%
Miami	MIA	2,183	2,075	2,101	1,946	2,190	2,190	0	0.00%
Lebanon	LEB					366	2,190	1,824	498.36%
Fort Lauderdale/Hollywood	FLL	2,691	3,075	2,619	2,610	2,801	1,972	-829	-29.58%
Milwaukee	MKE	1,839	2,184	1,670	1,695	1,731	1,889	158	9.15%
Minneapolis	MSP	2,009	1,792	1,697	1,678	1,725	1,878	153	8.89%
Cincinnati	CVG	2,724	2,640	2,014	2,012	2,004	1,876	-129	-6.41%
Denver	DEN	2,304	1,992	2,445	2,514	2,086	1,825	-261	-12.50%
Indianapolis	IND	1,142	2,079	1,862	1,833	1,816	1,813	-3	-0.17%
Provincetown	PVC	2,169	1,657	2,062	2,277	2,492	1,767	-725	-29.08%
Houston Intercontinental	IAH	1,569	1,753	1,857	1,913	1,804	1,749	-55	-3.06%
West Palm Beach	PBI	1,348	1,131	1,492	1,479	1,707	1,518	-189	-11.08%
Fort Myers	RSW	1,064	1,531	1,618	1,693	1,667	1,485	-182	-10.93%
Tampa	TPA	1,743	1,949	1,779	1,819	1,746	1,464	-282	-16.14%
Richmond	RIC	1,678	1,409	1,557	1,599	1,494	1,387	-107	-7.17%
Cleveland	CLE	1,263	1,262	1,314	1,387	1,457	1,377	-80	-5.48%
Rockland	RKD	1,360	1,375	1,357	1,268	897	1,279	382	42.65%
Columbus	CMH	2,083	2,118	1,792	1,828	1,551	1,269	-282	-18.19%
Phoenix	PHX	792	944	1,322	1,277	1,069	1,230	161	15.04%
Rochester	ROC		1,183	1,562	1,264	1,112	1,109	-3	-0.31%
Hyannis	HYA	1,852	1,057	996	1,177	963	1,095	132	13.69%
Rutland	RUT	627	644	626	704	1,095	1,095	0	0.00%
Saranac Lake	SLK	275	800	940	544	1,019	1,095	76	7.44%
Plattsburgh AFB	PBG				27	969	1,095	126	13.05%

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (continued)

Destination Airport	Code	2004	2005	2006	2007	2008	2009	2008-2009 Change	2008-2009 Percent Change
Las Vegas	LAS	1,474	1,679	1,762	1,725	1,394	1,060	-335	-24.01%
Presque Isle	PQI	1,028	1,018	1,018	1,004	991	991	0	0.00%
Syracuse	SYR	1,337	1,762	1,762	1,121	969	991	22	2.23%
Augusta	AUG	392	622	600	617	656	991	335	51.02%
Memphis	MEM	702	1,035	1,053	1,007	891	984	93	10.44%
Seattle/Tacoma	SEA	999	609	394	975	996	927	-70	-6.98%
St. Louis	STL	1,678	1,462	1,523	1,089	874	857	-18	-2.04%
Chicago Midway	MDW	1,198	1,340	1,131	1,086	363	834	472	130.05%
Bar Harbor	BHB	1,374	1,153	1,179	1,176	1,121	744	-376	-33.58%
Albany	ALB	1,387	1,074	661	1,254	533	711	178	33.35%
Salt Lake City	SLC	728	730	709	721	708	704	-4	-0.63%
Newport News	PHF	428	670	948	945	721	660	-62	-8.54%
Long Beach	LGB	692	853	840	813	736	647	-89	-12.04%
Harrisburg	MDT	932	887	744	685	726	630	-95	-13.15%
San Diego	SAN	306	365	365	549	608	592	-16	-2.66%
Bangor	BGR	3,195	2,949	2,532	2,447	1,084	555	-529	-48.78%
Akron/Canton	CAK	428	731	726	575	457	488	31	6.78%
Oakland	OAK	487	852	813	518	510	488	-22	-4.26%
Myrtle Beach	MYR	135	265	265	730	625	457	-169	-26.98%
Austin	AUS			352	365	365	365	0	0.00%
Portland	PDX				122	365	365	0	0.00%
Jacksonville	JAX		426	722	712	665	348	-317	-47.70%
New Orleans	MSY	244	191		4	253	339	85	33.71%
Kansas City	MCI		239	513	715	635	287	-348	-54.76%
Atlantic City	ACY	17					245	245	
Charleston	CHS	13	61	287	382	176	92	-84	-47.85%
Sarasota/Bradenton	SRQ		30	35	8	25	21	-4	-16.85%
Westchester County	HPN	1,908	2,258	2,053	1,233	735		-735	-100.00%
Islip	ISP	1,042	1,579	1,192	1,030	646		-646	-100.00%
Trenton	TTN			61	943	152		-152	-100.00%
Watertown	ART				707	152		-152	-100.00%
Norfolk	ORF	1,347	1,035	704	647	254		-254	-100.00%
Greensboro	GSO	1,177	1,122	657	600	176		-176	-100.00%
Burlington	BTV	1,098	1,631	931	452	118			-100.00%
Nashville	BNA			318	422	158		-158	-100.00%
Allentown/Bethlehem	ABE		622	779	417	101			-100.00%
San Jose	SJC	406	244	365	365	247		-247	-100.00%
Savannah	SAV	43	78	278	348	141			-100.00%
Dayton	DAY			98	270				
Louisville	SDF				122	86			-100.00%
Plattsburgh	PLB				26				
Portland, ME	PWM	1,569	1,396		4				
Manchester	MHT					72			-100.00%
Massena	MSS					28			-100.00%
Wilkes-Barre Scranton	AVP		417						
Columbia	CAE	91							

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (continued)

Destination Airport	Code	2004	2005	2006	2007	2008	2009	Change	Percent Change
International		19,882	19,848	18,638	20,014	18,295	16,647	-1,648	-9.01%
Toronto	YYZ	3,693	3,880	4,054	4,235	4,207	3,685	-522	-12.41%
London Heathrow	LHR	2,174	2,136	2,153	2,151	2,120	2,204	84	3.96%
Montreal Dorval	YUL	1,891	2,575	1,836	1,959	2,016	1,863	-153	-7.58%
Halifax	YHZ	2,271	1,892	1,605	1,622	1,161	1,091	-70	-6.06%
Ottawa	YOW	928	866	874	931	942	878	-65	-6.88%
Paris De Gaulle	CDG	868	853	787	671	633	632	0	-0.05%
Amsterdam	AMS	366	365	365	549	717	569	-148	-20.63%
Frankfurt	FRA	563	574	544	549	579	541	-38	-6.64%
Bermuda	BDA	580	518	513	685	655	506	-149	-22.76%
Aruba	AUA	274	339	289	304	343	475	133	38.78%
Reykjavik	KEF	353	361	361	418	413	396	-18	-4.29%
Toronto Island Apt	YTZ						370	370	
Shannon	SNN	436	735	796	383	365	339	-26	-7.16%
Zurich	ZRH	357	357	361	361	365	335	-30	-8.26%
Munich	MUC	214	208	213	214	266	335	68	25.70%
Rome Leonardo Da Vinci-	FCO	88	135	78	79	258	326	69	26.68%
Cancun	CUN	305	209	70	209	286	326	41	14.26%
Dublin	DUB	113			231	313	313	0	-0.05%
Madrid	MAD				157	219	248	29	13.46%
Nassau	NAS	69	100	431	211	232	185	-48	-20.53%
Ponta Delgada	PDL	61	39	109	148	126	170	44	34.62%
Punta Cana	PUJ			17	13	13	164	152	1193.26%
Santo Domingo	SDQ	192	174	160	170	86	144	58	66.61%
Praia, Cape Verde	RAI		9	78	83	74	109	35	47.48%
Montego Bay	MBJ	514	239	39	47	43	103	60	140.20%
Providenciales	PLS	43	44	48	39	17	100	82	480.83%
Charlottetown	YYG				62	92	83	-9	-9.63%
Saint Maarten	SXM						61	61	
Helsinki	HEL					26	26	0	0.00%
Lisbon	LIS			26	35	31	26	-4	-14.49%
Grand Cayman	GCM		31	43	13	43	26	-18	-40.46%
Terceira	TER			13	17	17	17	0	0.00%
San Juan	SJU	1,515	1,240	1,292	1,413	1,239			-100.00%
Fredericton	YFC	732	687	365	579	62			-100.00%
Quebec	YQB		30	213	579	62			-100.00%
Milan Malpensa	MXP	362	344	335	361	191			-100.00%
Manchester	MAN	184	239	244	214				
Saint Thomas	STT	104	108	117	99	82			-100.00%
Glasgow	GLA				79				
Knock	NOC				44				
Stockholm-Arlanda	ARN			26	39				
Santiago	STI				31				
Mexico City	MEX	331	235	52	17				
Las Palmas	LPA				13				
San Salvador	SAL	187	178	131					
Vancouver	YVR	92	61						
Ilha Do Sal, Cape Verde	SID	22	57						
Nykoping, Sweden	NYO		30						
Port Au Prince	PAP	56							
Lerwick Sumburgh Apt	LSI	31							
Total Scheduled Carrier Operations		186,094	185,697	186,900	185,387	172,394	165,648	-6,746	-3.91%

Source: OAG Schedules.
Note: Annualized airline schedules do not reflect service disruptions of schedule changes that occurred during September as a result of September 11, 2001.

F

Regional Transportation Context

This appendix provides detailed tables in support of *Chapter 4, Regional Transportation Context*:

- Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2009
- Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2009
- Scheduled Passenger Operations by Market and Carrier for New England's Regional Airports
  - Table F-3 Bradley International Airport, Connecticut
  - Table F-4 T.F. Green Airport, Rhode Island
  - Table F-5 Manchester-Boston Regional Airport, New Hampshire
  - Table F-6 Portland International Jetport, Maine
  - Table F-7 Burlington International Airport, Vermont
  - Table F-8 Bangor International Airport, Maine
  - Table F-9 Tweed-New Haven Airport, Connecticut
  - Table F-10 Worcester Regional Airport, Massachusetts
  - Table F-11 Hanscom Field, Massachusetts
  - Table F-12 Portsmouth International Airport, New Hampshire

Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2009

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International Tradeport	Hanscom Field	Subtotal	Logan[2]	Total
2000													
Commercial	132,062	103,750	61,506	47,609	45,745	21,446	5,260	4,029	6,104	6,572	434,083	452,763	886,846
General Aviation[1]	31,863	52,184	45,740	56,571	59,377	34,831	56,200	46,518	31,601	204,512	619,397	35,233	654,630
Military & Other	5,811	2,764	586	2,072	10,241	26,507	328	495	9,973	1,287	60,064	0	60,064
Total	169,736	158,698	107,832	106,252	115,363	82,784	61,788	51,042	47,678	212,371	1,113,544	487,996	1,601,540
2001													
Commercial	128,638	100,606	61,669	47,770	47,261	18,286	4,581	5,631	4,485	6,414	425,341	434,386	859,727
General Aviation[1]	30,478	45,095	44,358	62,014	61,986	35,230	56,092	45,464	30,148	197,770	608,635	28,739	637,374
Military & Other	5,913	2,635	607	2,259	11,821	26,623	437	917	8,221	1,252	60,685	0	60,685
Total	165,029	148,336	106,634	112,043	121,068	80,139	61,110	52,012	42,854	205,436	1,094,661	463,125	1,557,786
2002													
Commercial	113,194	96,595	62,346	45,899	38,929	24,412	3,827	4,062	5,059	6,603	400,926	366,476	767,402
General Aviation[1]	27,838	45,473	29,549	57,720	59,679	35,711	62,163	52,277	28,333	210,221	608,964	25,596	634,560
Military & Other	6,085	2,587	376	2,162	12,167	27,297	593	418	8,220	1,424	61,329	0	61,329
Total	147,117	144,655	92,271	105,781	110,775	87,420	66,583	56,757	41,612	218,248	1,071,219	392,072	1,463,291
2003													
Commercial	103,917	84,301	68,184	42,658	38,293	25,626	3,705	868	4,552	2,956	375,060	344,644	719,704
General Aviation[1]	27,115	42,878	29,552	44,036	50,461	36,706	54,224	55,972	24,866	190,789	556,599	28,660	585,259
Military & Other	4,214	2,496	324	1,449	11,466	32,938	776	378	7,720	1,142	62,903	0	62,903
Total	135,246	129,675	98,060	88,143	100,220	95,270	58,705	57,218	37,138	194,887	994,562	373,304	1,367,866
2004													
Commercial	108,823	83,496	75,360	46,474	41,719	24,970	4,501	0	3,981	4,308	393,632	374,022	767,654
General Aviation[1]	32,269	34,878	27,438	41,547	54,709	29,884	58,881	61,343	25,962	175,301	542,212	31,236	573,448
Military & Other	4,100	346	749	1,338	12,404	29,676	1,010	530	7,797	1,195	59,145	0	59,145
Total	145,192	118,720	103,547	89,359	108,832	84,530	64,392	61,873	37,740	180,804	994,989	405,258	1,400,247
2005													
Commercial	119,048	88,374	76,342	42,661	43,987	25,976	6,137	2,727	3,197	3,627	412,076	377,830	789,906
General Aviation[1]	33,341	28,138	26,369	36,191	49,888	30,016	60,893	62,743	25,446	165,424	518,449	31,236	549,685
Military & Other	3,701	241	479	1,405	11,468	24,154	1,063	519	7,669	904	51,603	0	51,603
Total	156,090	116,753	103,190	80,257	105,343	80,146	68,093	65,989	36,312	169,955	982,128	409,066	1,391,194
2006													
Commercial	111,341	81,282	67,326	38,663	41,342	23,466	5,177	3,793	3,981	3,057	379,428	374,675	754,103
General Aviation[1]	34,548	25,510	25,074	35,572	44,471	29,848	51,702	56,770	25,962	167,560	497,017	31,444	528,461
Military & Other	4,348	229	738	1,536	9,299	22,359	1,157	609	7,797	1,433	49,505	0	49,505
Total	150,237	107,021	93,138	75,771	95,112	75,673	58,036	61,172	37,740	172,050	925,950	406,119	1,332,069
2007													
Commercial	107,097	80,525	69,134	41,450	39,928	22,571	4,594	3,162	4,270	3,477	376,208	370,905	747,113
General Aviation[1]	29,308	22,984	23,959	31,724	47,521	25,542	51,200	61,296	27,000	160,992	481,526	28,632	510,158
Military & Other	5,097	242	644	1,384	9,528	20,949	944	879	8,017	1,438	49,122	0	49,122
Total	141,502	103,751	93,737	74,558	96,977	69,062	56,738	65,337	39,287	165,907	906,856	399,537	1,306,393
2008													
Commercial	98,194	73,096	63,505	40,834	37,832	19,282	4,013	2,553	1,347	104	340,760	347,784	688,544
General Aviation[1]	22,908	19,470	16,198	31,869	46,391	27,143	44,642	43,763	31,051	164,195	447,630	23,820	471,450
Military & Other	3,637	187	840	974	9,688	20,449	243	886	7,993	1,590	46,487	0	46,487
Total	124,739	92,753	80,543	73,677	93,911	66,874	48,898	47,202	40,391	165,889	834,877	371,604	1,206,481
2009													
Commercial	82,021	62,233	54,336	35,909	31,068	16,485	3,096	2,527	422	0	288,097	333,064	621,161
General Aviation[1]	19,586	19,438	14,354	25,473	16,009	19,558	37,722	41,700	25,161	148,696	367,697	12,242	379,939
Military & Other	2,726	260	1,163	778	4,104	16,267	486	17	6,851	1,215	33,867	0	33,867
Total	104,333	81,931	69,853	62,160	51,181	52,310	41,304	44,244	32,434	149,911	689,661	345,306	1,034,967

Source: Massport, Federal Aviation Administration (FAA) Tower Counts, and individual airport records.

Note: 2001 General Aviation data for New Haven includes general aviation, military, and other operations.

[1] Includes itinerant and local general aviation operations at the regional airports. There are no local (touch-and-go training) operations at Logan Airport.

[2] Includes international operations.

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2009

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International Tradeport	Hanscom Field	Subtotal	Logan[2]	Total
2000 to 2001													
Commercial	(2.59%)	(3.03%)	0.27%	0.34%	3.31%	(14.73%)	(12.91%)	39.76%	(26.52%)	(2.40%)	(2.01%)	(4.06%)	(3.06%)
General Aviation[1]	(4.35%)	(13.58%)	(3.02%)	9.62%	4.39%	1.15%	(0.19%)	(2.27%)	(4.60%)	(3.30%)	(1.74%)	(18.43%)	(2.64%)
Military & Other	1.76%	(4.67%)	3.58%	9.03%	15.43%	0.44%	33.23%	85.25%	(17.57%)	(2.72%)	1.03%	-	1.03%
Total	(2.77%)	(6.53%)	(1.11%)	5.45%	4.95%	(3.20%)	(1.10%)	1.90%	(10.12%)	(3.27%)	(1.70%)	(5.10%)	(2.73%)
2001 Percent of Total	10.59%	9.52%	6.85%	7.19%	7.77%	5.14%	3.92%	3.34%	2.75%	13.19%	70.27%	29.73%	100.00%
2001 to 2002													
Commercial	(12.01%)	(3.99%)	1.10%	(3.92%)	(17.63%)	33.50%	(16.46%)	(27.86%)	12.80%	2.95%	(5.74%)	(15.63%)	(10.74%)
General Aviation[1]	(8.66%)	0.84%	(33.39%)	(6.92%)	(3.72%)	1.37%	10.82%	14.99%	(6.02%)	6.30%	0.05%	(10.94%)	(0.44%)
Military & Other	2.91%	(1.82%)	(38.06%)	(4.29%)	2.93%	2.53%	35.70%	(54.42%)	(0.01%)	13.74%	1.06%	-	1.06%
Total	(10.85%)	(2.48%)	(13.47%)	(5.59%)	(8.50%)	9.09%	8.96%	9.12%	(2.90%)	6.24%	(2.14%)	(15.34%)	(6.07%)
2002 Percent of Total	9.92%	4.22%	0.61%	3.53%	19.84%	44.51%	0.97%	0.68%	13.40%	2.32%	100.00%	0.00%	100.00%
2002 to 2003													
Commercial	(8.20%)	(12.73%)	9.36%	(7.06%)	(1.63%)	4.97%	(3.19%)	(78.63%)	(10.02%)	(55.23%)	(6.45%)	(5.96%)	(6.22%)
General Aviation[1]	(2.60%)	(5.71%)	0.01%	(23.71%)	(15.45%)	2.79%	(12.77%)	7.07%	(12.24%)	(9.24%)	(8.60%)	11.97%	(7.77%)
Military & Other	(30.75%)	(3.52%)	(13.83%)	(32.98%)	(5.76%)	20.67%	30.86%	(9.57%)	(6.08%)	(19.80%)	2.57%	-	2.57%
Total	(8.07%)	(10.36%)	6.27%	(16.67%)	(9.53%)	8.98%	(11.83%)	0.81%	(10.75%)	(10.70%)	(7.16%)	(4.79%)	(6.52%)
2003 Percent of Total	9.89%	9.48%	7.17%	6.44%	7.33%	6.96%	4.29%	4.18%	2.72%	14.25%	72.71%	27.29%	100.00%
2003 to 2004													
Commercial	4.72%	(0.95%)	10.52%	8.95%	8.95%	(2.56%)	21.48%	(100.00%)	(12.54%)	45.74%	4.95%	8.52%	6.66%
General Aviation[1]	19.01%	(18.66%)	(7.15%)	(5.65%)	8.42%	(18.59%)	8.59%	9.60%	4.41%	(8.12%)	(2.58%)	8.99%	(2.02%)
Military & Other	(2.71%)	(86.14%)	131.17%	(7.66%)	8.18%	(9.90%)	30.15%	40.21%	1.00%	4.64%	(5.97%)	-	(5.97%)
Total	7.35%	(8.45%)	5.60%	1.38%	8.59%	(11.27%)	9.69%	8.14%	1.62%	(7.23%)	0.04%	8.56%	2.37%
2004 Percent of Total	10.37%	8.48%	7.39%	6.38%	7.77%	6.04%	4.60%	4.42%	2.70%	12.91%	71.06%	28.94%	100.00%
2004 to 2005													
Commercial	9.40%	5.84%	1.30%	(8.20%)	5.44%	4.03%	36.35%	-	(19.69%)	(15.81%)	4.69%	1.02%	2.90%
General Aviation[1]	3.32%	(19.32%)	(3.90%)	(12.89%)	(8.81%)	0.44%	3.42%	2.28%	(1.99%)	(5.63%)	(4.38%)	0.00%	(4.14%)
Military & Other	(9.73%)	(30.35%)	(36.05%)	5.01%	(7.55%)	(18.61%)	5.25%	(2.08%)	(1.64%)	(24.35%)	(12.75%)	-	(12.75%)
Total	7.51%	(1.66%)	(0.34%)	(10.19%)	(3.21%)	(5.19%)	5.75%	6.65%	(3.78%)	(6.00%)	(1.29%)	0.94%	(0.65%)
2005 Percent of Total	11.22%	8.39%	7.42%	5.77%	7.57%	5.76%	4.89%	4.74%	2.61%	12.22%	70.60%	29.40%	100.00%

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2009 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International Tradeport	Hanscom Field	Subtotal	Logan[2]	Total
2005 to 2006													
Commercial	(6.47%)	(8.02%)	(11.81%)	(9.37%)	(6.01%)	(9.66%)	(15.64%)	39.09%	24.52%	(15.72%)	(7.92%)	(0.84%)	(4.53%)
General Aviation[1]	3.62%	(9.34%)	(4.91%)	(1.71%)	(10.86%)	(0.56%)	(15.09%)	(9.52%)	2.03%	1.29%	(4.13%)	0.67%	(3.86%)
Military & Other	17.48%	(4.98%)	54.07%	9.32%	(18.91%)	(7.43%)	8.84%	17.34%	1.67%	58.52%	(4.07%)	-	(4.07%)
Total	(3.75%)	(8.34%)	(9.74%)	(5.59%)	(9.71%)	(5.58%)	(14.77%)	(7.30%)	3.93%	1.23%	(5.72%)	(0.72%)	(4.25%)
2006 Percent of Total	10.83%	7.94%	7.18%	5.71%	7.42%	5.29%	4.34%	5.00%	3.01%	12.70%	69.42%	30.58%	100.00%
2006 to 2007													
Commercial	(3.81%)	(0.93%)	2.69%	7.21%	(3.42%)	(3.81%)	(11.26%)	(16.64%)	7.26%	13.74%	(0.85%)	(1.01%)	(0.93%)
General Aviation[1]	(15.17%)	(9.90%)	(4.45%)	(10.82%)	6.86%	(14.43%)	(0.97%)	7.97%	4.00%	(3.92%)	(3.12%)	(8.94%)	(3.46%)
Military & Other	17.23%	5.68%	(12.74%)	(9.90%)	2.46%	(6.31%)	(18.41%)	44.33%	2.82%	0.35%	(0.77%)	-	(0.77%)
Total	(5.81%)	(3.06%)	0.64%	(1.60%)	1.96%	(8.74%)	(2.24%)	6.81%	4.10%	(3.57%)	(2.06%)	(1.62%)	(1.93%)
2007 Percent of Total	10.83%	7.94%	7.18%	5.71%	7.42%	5.29%	4.34%	5.00%	3.01%	12.70%	69.42%	30.58%	100.00%
2007 to 2008													
Commercial	(8.31%)	(9.23%)	(8.14%)	(1.49%)	(5.25%)	(14.57%)	(12.65%)	(19.26%)	(68.45%)	(97.01%)	(9.42%)	(6.23%)	(7.84%)
General Aviation[1]	(21.84%)	(15.29%)	(32.39%)	0.46%	(2.38%)	6.27%	(12.81%)	(28.60%)	15.00%	1.99%	(7.04%)	(16.81%)	(7.59%)
Military & Other	(28.64%)	(22.73%)	30.43%	(29.62%)	1.68%	(2.39%)	(74.26%)	0.80%	(0.30%)	10.57%	(5.36%)	-	(5.36%)
Total	(11.85%)	(10.60%)	(14.08%)	(1.18%)	(3.16%)	(3.17%)	(13.82%)	(27.76%)	2.81%	(0.01%)	(7.94%)	(6.99%)	(7.65%)
2008 Percent of Total	10.34%	7.69%	6.68%	6.11%	7.78%	5.54%	4.05%	3.91%	3.35%	13.75%	69.20%	30.80%	100.00%
2008 to 2009													
Commercial	(16.47%)	(14.86%)	(14.44%)	(12.06%)	(17.88%)	(14.51%)	(22.85%)	(1.02%)	(68.67%)	(100.00%)	(15.45%)	(4.23%)	(9.79%)
General Aviation[1]	(14.50%)	(0.16%)	(11.38%)	(20.07%)	(65.49%)	(27.94%)	(15.50%)	(4.71%)	(18.97%)	(9.44%)	(17.86%)	(48.61%)	(19.41%)
Military & Other	(25.05%)	39.04%	38.45%	(20.12%)	(57.64%)	(20.45%)	100.00%	(98.08%)	(14.29%)	(23.58%)	(27.15%)	-	(27.15%)
Total	(16.36%)	(11.67%)	(13.27%)	(15.63%)	(45.50%)	(21.78%)	(15.53%)	(6.27%)	(19.70%)	(9.63%)	(17.39%)	(7.08%)	(14.22%)
2009 Percent of Total	10.08%	7.92%	6.75%	6.01%	4.95%	5.05%	3.99%	4.27%	3.13%	14.48%	66.64%	33.36%	100.00%

Source: Massport, Federal Aviation Administration (FAA) Tower Counts, and individual airport records.

Note: 2001 to 2002 General Aviation data for New Haven includes general aviation, military, and other operations.

Includes itinerant and local general aviation operations at the regional airports. There are no local (touch-and-go training) operations at Logan Airport.

Includes international operations.

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport

				Departures							Seats						
Carrier	Code	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																	
America West	HP	Phoenix	PHX	366	364	61			-	-	54,627	54,558	7,517			-	-
American	AA	Chicago O'Hare	ORD	1,574	957				-	-	204,054	123,444				-	-
American	AA	Dallas/Fort Worth	DFW	1,055	1,078	1,087	1,061	1,039	-22	-2.0%	137,038	143,630	153,940	157,006	153,802	-3,204	-2.0%
American	AA	Miami	MIA	366	365	364	364	364	0	0.0%	50,059	52,558	51,527	53,831	53,831	0	0.0%
American	AA	San Juan	SJU	366	364	364	364	364	0	0.0%	54,594	81,473	70,683	65,470	56,740	-8,729	-13.3%
Continental	CO	Cleveland	CLE	131	91	130	104	74	-30	-29.2%	16,182	9,803	16,108	12,626	9,084	-3,542	-28.1%
Continental	CO	Houston Intercontinental	IAH	314	225	229	117		-	-	34,139	26,361	26,162	13,458		-13,458	-100.0%
Continental	CO	New York Newark	EWR			4			-	-			450			-	-
Delta	DL	Atlanta	ATL	3,133	2,399	2,152	2,139	2,096	-43	-2.0%	480,501	346,019	325,893	326,798	298,991	-27,807	-8.5%
Delta	DL	Cancun	CUN				30	30	0	1.0%				5,092	4,547	-546	-10.7%
Delta	DL	Cincinnati	CVG	1,378	766	559	658	251	-407	-61.8%	197,099	102,413	81,465	96,442	37,939	-58,503	-60.7%
Delta	DL	Detroit	DTW					957	957	-					113,429	113,429	-
Delta	DL	Fort Lauderdale/Hollywood	FLL		472	667	476	281	-195	-40.9%		78,602	96,975	69,968	39,966	-30,003	-42.9%
Delta	DL	Fort Myers	RSW		30	143	121	121	0	0.0%		4,304	20,290	17,216	17,459	242	1.4%
Delta	DL	Las Vegas	LAS		108				-	-		16,238				-	-
Delta	DL	Los Angeles	LAX		208	286	134		-134	-100.0%		31,890	42,867	20,481		-20,481	-100.0%
Delta	DL	Minneapolis	MSP					650	650	-					84,175	84,175	-
Delta	DL	Orlando	MCO		524	823	688	671	-17	-2.5%		87,704	118,140	105,951	93,277	-12,674	-12.0%
Delta	DL	Salt Lake City	SLC	26	207				-	-	3,915	31,176				-	-
Delta	DL	Tampa	TPA		450	658	468	442	-26	-5.6%		72,060	93,459	66,474	58,282	-8,192	-12.3%
Delta	DL	West Palm Beach	PBI		242	355	368	364	-4	-1.2%		38,130	50,938	53,610	47,985	-5,625	-10.5%
Frontier Airlines	F9	Denver	DEN			303	208		-208	-100.0%			40,009	27,435		-27,435	-100.0%
Northwest	NW	Amsterdam	AMS			182	273		-273	-100.0%			29,098	43,646		-43,646	-100.0%
Northwest	NW	Detroit	DTW	1,456	1,394	1,368	1,182		-1,182	-100.0%	192,970	180,912	177,669	151,611		-151,611	-100.0%
Northwest	NW	Minneapolis	MSP	1,046	1,057	1,057	996		-996	-100.0%	140,375	146,804	142,440	129,207		-129,207	-100.0%
Song	DLS	Fort Lauderdale/Hollywood	FLL	676	242				-	-	134,176	48,254				-	-
Song	DLS	Los Angeles	LAX	100	82				-	-	19,910	16,372				-	-
Song	DLS	Orlando	MCO	1,099	364				-	-	218,144	72,380				-	-
Song	DLS	Tampa	TPA	680	229				-	-	135,041	45,669				-	-
Song	DLS	West Palm Beach	PBI	519	121				-	-	103,012	24,127				-	-
Southwest	WN	Baltimore	BWI	3,104	3,104	3,126	2,866	2,702	-165	-5.7%	424,316	424,877	427,904	392,120	369,838	-22,282	-5.7%
Southwest	WN	Chicago Midway	MDW	954	1,031	1,057	1,026	935	-91	-8.9%	130,513	141,184	144,743	139,681	128,133	-11,548	-8.3%
Southwest	WN	Las Vegas	LAS	366	364	364	364	364	0	0.0%	50,060	49,830	49,830	49,830	49,830	0	0.0%
Southwest	WN	Nashville	BNA	366	364	364	364	364	0	0.0%	50,060	49,830	49,830	49,505	49,830	325	0.7%
Southwest	WN	Orlando	MCO	1,112	1,104	1,087	1,074	1,044	-30	-2.8%	151,967	151,269	148,380	147,116	142,964	-4,152	-2.8%
Southwest	WN	Philadelphia	PHL	1,595	1,074	173			-	-	218,118	147,116	23,728			-	-
Southwest	WN	Tampa	TPA	698	727	727	732	424	-307	-42.0%	95,352	99,659	99,023	100,252	58,135	-42,118	-42.0%

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

				Departures							Seats						
Carrier	Code	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
United	UA	Chicago O'Hare	ORD	1,818	1,810	1,793	1,632	1,360	-273	-16.7%	259,712	253,288	258,562	236,531	200,314	-36,216	-15.3%
United	UA	Washington Dulles	IAD	728	940	1,108	1,070	1,005	-65	-6.1%	81,728	111,047	133,277	130,359	131,329	970	0.7%
US Airways	US	Charlotte	CLT	2,197	1,654	1,511	1,091	1,100	9	0.8%	351,454	227,078	218,427	164,215	145,973	-18,242	-11.1%
US Airways	US	Fort Lauderdale/Hollywood	FLL	126					-	-	15,503					-	-
US Airways	US	Orlando	MCO	31	30				-	-	3,863	3,741				-	-
US Airways	US	Philadelphia	PHL	2,110	927	442	346	580	234	67.5%	301,864	139,404	63,694	46,790	57,987	11,197	23.9%
US Airways	US	Phoenix	PHX			238	333		-333	-100.0%			28,578	40,009		-40,009	-100.0%
US Airways	US	Pittsburgh	PIT	26					-	-	3,132					-	-
US Airways	US	Washington National	DCA	1,068	944	1,087	961	753	-208	-21.6%	141,279	129,831	142,725	120,045	84,660	-35,385	-29.5%
USA 3000 Airlines	U5	Cancun	CUN	26	30	22			-	-	4,307	5,092	3,637			-	-
USA 3000 Airlines	U5	Punta Cana	PUJ	13	22	17			-	-	2,114	3,637	2,910			-	-
Subtotal				30,623	26,464	23,906	21,611	18,333	-3,278	-15.2%	4,461,178	3,771,764	3,340,876	3,032,775	2,488,499	-544,277	-17.9%
Regional/Commuter Carriers																	
Air Canada Jazz	QK	Montreal Dorval	YUL														-
Air Canada Jazz	QK	Toronto	YYZ	719	966	961	927	775	-152	-16.4%	26,557	36,121	35,567	34,285	28,678	-5,607	-16.4%
Air Georgian (AC)	AC2	Montreal Dorval	YUL	1,042	1,018	1,039	1,018	1,005	-13	-1.3%	19,496	19,333	19,745	19,333	19,087	-247	-1.3%
Air Georgian (AC)	AC2	Toronto	YYZ	628	312	312	307	507	199	64.8%	11,732	5,923	5,923	5,841	9,626	3,784	64.8%
America West Express/Mesa	HP1	Charlotte	CLT			165			-	-			14,150			-	-
American Connection/Chautauqua	AA3	St. Louis	STL			740	823	212	-611	-74.2%			32,579	36,199	9,335	-26,863	-74.2%
American Connection/Transtates	AX	St. Louis	STL	950	892	212			-	-	44,361	44,599	10,609			-	-
American Eagle	AA2	Chicago O'Hare	ORD		697	1,819	1,290	1,031	-260	-20.1%		33,921	80,018	57,295	50,202	-7,093	-12.4%
American Eagle	AA2	Raleigh/Durham	RDU	1,369	1,364	1,182	1,147	1,039	-108	-9.4%	54,597	52,133	44,586	43,971	44,997	1,026	2.3%
American Eagle	AA2	Saint Louis	STL					91	91	-					4,547	4,547	-
Continental Connection/Colgan	CO4	New York Newark	EWR				580		-580	-100.0%				42,936		-42,936	-100.0%
Continental Connection/CommutAir	CO2	New York Newark	EWR				87	372	286	330.0%				3,204	13,778	10,574	330.0%
Continental Express	CO1	Cleveland	CLE	1,107	1,156	935	459	316	-143	-31.1%	55,075	57,806	46,708	22,724	15,805	-6,919	-30.4%
Continental Express	CO1	New York Newark	EWR	1,356	1,360	1,381	693	840	147	21.3%	67,529	67,981	66,474	34,021	42,001	7,980	23.5%
Continental Express/Chautauqua	CO5	Cleveland	CLE			212	680	844	165	24.2%			10,609	33,991	42,218	8,227	24.2%
Delta Connection/ASA	EV	Atlanta	ATL		82		4		-4	-100.0%		5,789		303		-303	-100.0%
Delta Connection/ASA	EV	Cincinnati	CVG			13	35		-35	-100.0%			909	1,732		-1,732	-100.0%
Delta Connection/Chautauqua	RP	Cincinnati	CVG		100	4	121	268	147	121.4%		4,980	217	6,062	13,423	7,361	121.4%
Delta Connection/Chautauqua	RP	Columbus	CMH	998	541	593	191		-191	-100.0%	49,299	23,685	29,604	9,526		-9,526	-100.0%
Delta Connection/Chautauqua	RP	New York JFK	JFK		113				-	-		4,165				-	-
Delta Connection/Comair	OH	Cincinnati	CVG			779	472	455	-17	-3.7%			48,669	28,275	28,795	520	1.8%
Delta Connection/Comair	OH	Columbus	CMH		78				-	-		3,897				-	-
Delta Connection/Comair	OH	Detroit	DTW					52	52	-					2,598	2,598	-
Delta Connection/Comair	OH	Fort Lauderdale	FLL				52		-52	-100.0%				3,637		-3,637	-100.0%
Delta Connection/Comair	OH	Fort Myers	RSW		359		4		-4	-100.0%		25,157		303		-303	-100.0%
Delta Connection/Comair	OH	New York JFK	JFK			390	710	489	-221	-31.1%			19,485	35,506	24,465	-11,042	-31.1%
Delta Connection/Comair	OH	Orlando	MCO		87				-	-		6,062				-	-
Delta Connection/Comair	OH	Tampa	TPA				78		-78	-100.0%				5,456		-5,456	-100.0%
Delta Connection/Comair	OH	West Palm Beach	PBI				9		-9	-100.0%				606		-606	-100.0%

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

				Departures							Seats						
Carrier	Code	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Delta Connection/Freedom	F8	Cincinnati	CVG				61	338	277	457.1%				3,031	16,887	13,856	457.1%
Delta Connection/Freedom	F8	New York JFK	JFK		429	784	333	303	-30	-9.1%		15,861	28,998	16,671	15,155	-1,516	-9.1%
Delta Connection/Mesaba	XJ	Detroit	DTW					520	520	-					39,264	39,264	-
Delta Connection/Mesaba	XJ	Minneapolis	MSP					459	459	-					34,882	34,882	-
Delta Connection/Pinnacle	DL3	Cincinnati	CVG				22	22	0	0.0%				1,516	1,516	0	0.0%
Delta Connection/Pinnacle	DL3	Detroit	DTW					229	229	-					11,475	11,475	-
Delta Connection/Pinnacle	DL3	Indianapolis	IND					78	78	-					3,897	3,897	-
Midwest Connect	YX1	Milwaukee	MKE		940	827			-	-		30,068	35,272			-	-
Midwest Connect/Skywest	YX2	Milwaukee	MKE				528		-528	-100.0%				26,413		-26,413	-100.0%
Northwest Airlink/Mesaba	XJ	Detroit	DTW				182		-182	-100.0%				13,821		-13,821	-100.0%
Northwest Airlink/Mesaba	XJ	Minneapolis	MSP				56		-56	-100.0%				4,278		-4,278	-100.0%
Northwest Airlink/Pinnacle	9E	Detroit	DTW		95	329	338		-338	-100.0%		4,763	16,454	16,887		-16,887	-100.0%
Northwest Airlink/Pinnacle	9E	Indianaplolis	IND	640	624	606	606		-606	-100.0%	31,973	31,176	30,310	30,310		-30,310	-100.0%
Northwest Airlink/Pinnacle	9E	Memphis	MEM				52		-52	-100.0%				2,598		-2,598	-100.0%
Northwest Airlink/Pinnacle	9E	Minneapolis	MSP	31					-	-	1,522					-	-
United Express	UAX	Chicago O'Hare	ORD	693	688	688	498	381	-117	-23.5%	48,416	48,106	47,258	34,025	26,292	-7,733	-22.7%
United Express	UAX	Washington Dulles	IAD	1,526	1,013	792	688	706	17	2.5%	84,651	63,218	48,955	47,084	46,634	-450	-1.0%
US Airways Express	US	Buffalo	BUF	841	827	810	95		-95	-100.0%	28,627	28,119	27,530	3,239		-3,239	-100.0%
US Airways Express	US	Charlotte	CLT		104	121	966	1,031	65	6.7%		6,686	10,167	82,530	86,254	3,724	4.5%
US Airways Express	US	Philadelphia	PHL	440	1,936	2,464	2,382	2,009	-372	-15.6%	27,675	119,257	176,785	181,228	147,991	-33,237	-18.3%
US Airways Express	US	Pittsburgh	PIT	1,652	1,628	1,576	970	935	-35	-3.6%	84,729	88,358	79,949	48,496	46,764	-1,732	-3.6%
US Airways Express	US	Rochester	ROC	576	567	611	524	572	48	9.1%	19,570	19,286	20,758	17,814	19,433	1,619	9.1%
US Airways Express	US	Syracuse	SYR	480					-	-	9,091					-	-
US Airways Express	US	Washington National	DCA	554	896	862	914	901	-13	-1.4%	34,513	58,884	51,181	62,724	59,867	-2,858	-4.6%
Subtotal				15,602	18,872	21,208	18,900	16,779	-2,121	-11.2%	699,413	905,333	1,039,468	1,017,870	905,862	-112,008	-11.0%
Total				46,225	45,336	45,114	40,511	35,112	-5,399	-13.3%	5,160,591	4,677,097	4,380,345	4,050,646	3,394,361	-656,285	-16.2%

Source: OAG Schedules.
Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F. Green Airport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																
American	Dallas/Fort Worth	DFW	366	91				-	-	47,137	11,730				-	-
American	Chicago O'Hare	ORD	1,116	260				-	-	143,654	33,514				-	-
Continental	Cleveland	CLE	13					-	-	1,618					-	-
Continental	New York Newark	EWR	283		247	39		-39	-100.0%	34,878		27,140	4,443		-4,443	-100.0%
Delta	Atlanta	ATL	1,984	827	255	26	43	17	66.7%	291,407	108,527	36,524	3,689	6,149	2,459	66.7%
Delta	Cincinnati	CVG	698	238				-	-	89,332	23,815				-	-
Delta	Detroit	DTW					1,000	1,000	-					104,080	104,080	-
Northwest	Detroit	DTW	1,557	1,390	1,273	1,113		-1,113	-100.0%	202,545	191,057	162,531	143,081		-143,081	-100.0%
Northwest	Minneapolis	MSP	541	303	281			-	-	68,974	41,949	34,900			-	-
SATA	Ponta Delgada	PDL		17	13	13		-13	-100.0%		3,464	2,598	2,598		-2,598	-100.0%
Southwest	Baltimore	BWI	4,194	4,235	4,243	3,971	3,416	-554	-14.0%	573,304	580,159	579,181	543,844	467,263	-76,580	-14.1%
Southwest	Chicago Midway	MDW	1,352	1,368	1,394	1,381	1,225	-156	-11.3%	184,745	187,454	190,724	189,234	166,969	-22,265	-11.8%
Southwest	Fort Lauderdale/Hollywood	FLL			221	424	654	229	54.1%			30,254	58,135	89,575	31,440	54.1%
Southwest	Las Vegas	LAS	31	364	364	364	364	0	0.0%	4,172	49,830	49,830	49,830	49,830	0	0.0%
Southwest	Philadelphia	PHL	1,779	1,910	1,979	1,710	1,663	-48	-2.8%	238,645	261,216	271,097	228,537	227,793	-745	-0.3%
Southwest	Kansas City	MCI	366	30				-	-	50,060	4,152				-	-
Southwest	Nashville	BNA	724	394	364	364	364	0	0.0%	98,928	53,982	49,830	49,830	48,985	-844	-1.7%
Southwest	Orlando	MCO	1,827	1,832	2,022	2,148	1,836	-312	-14.5%	249,703	250,928	277,029	294,232	251,131	-43,101	-14.6%
Southwest	Phoenix	PHX	728	727	637	364	364	0	0.0%	99,523	99,659	87,202	49,830	49,830	0	0.0%
Southwest	Tampa	TPA	1,090	1,087	1,091	987	823	-165	-16.7%	148,987	148,896	149,489	135,252	111,801	-23,451	-17.3%
Spirit Airlines	Detroit	DTW	122					-	-	18,270					-	-
Spirit Airlines	Fort Lauderdale/Hollywood	FLL	571	398	152			-	-	84,381	57,208	21,174			-	-
Spirit Airlines	Fort Myers	RSW	366	182	186			-	-	54,810	29,825	32,969			-	-
United	Chicago O'Hare	ORD	1,465	1,485	1,485	996	727	-268	-27.0%	200,813	188,468	178,725	123,500	97,815	-25,686	-20.8%
US Airways	Charlotte	CLT	1,866	1,429	1,251	1,290	1,650	359	27.9%	274,911	223,415	180,448	174,949	207,372	32,423	18.5%
US Airways	Fort Lauderdale/Hollywood	FLL	17					-	-	2,218					-	-
US Airways	Orlando	MCO	44	13	13	9		-9	-100.0%	148,874		1,871	1,091		-1,091	-100.0%
US Airways	Philadelphia	PHL	2,193	1,126	1,048	359	922	563	156.6%	313,648	148,874	134,901	45,902	96,862	50,960	111.0%
US Airways	Pittsburgh	PIT	31					-	-	4,367					-	-
US Airways	Washington National	DCA	1,273	1,329	758	576	463	-113	-19.5%	170,102	176,014	96,585	71,887	57,987	-13,899	-19.3%
Subtotal			26,597	21,035	19,277	16,134	15,514	-619	-3.8%	3,800,006	2,874,136	2,594,999	2,169,863	2,033,442	-136,421	-6.3%

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F. Green Airport (Continued)

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Regional/Commuter Carriers																
Air Georgian (AC)	Toronto	YYZ	737	697	697	654	637	-17	-2.6%	13,794	13,245	13,245	12,423	12,094	-329	-2.6%
America West Express/Mesa	Charlotte	CLT			126			-	-			10,799			-	-
American Eagle	Chicago O'Hare	ORD		836	1,091	779		-779	-100.0%		36,822	48,219	34,294		-34,294	-100.0%
American Eagle	Raleigh/Durham	RDU	349					-	-	13,276					-	-
Cape Air	Hyannis			1,273				-	-		11,457				-	-
Cape Air	Martha's Vineyard	MVY	1,012	26	1,005	961	788	-173	-18.0%	9,083	234	9,041	8,651	7,093	-1,559	-18.0%
Cape Air	Nantucket	ACK	1,195	1,035	1,173	875	727	-147	-16.8%	10,727	9,314	10,561	7,872	6,547	-1,325	-16.8%
Continental Connection/Colgan	New York Newark	EWR				619	1,039	420	67.8%				45,820	76,901	31,081	67.8%
Continental Express	Cleveland	CLE	1,243	4	637	359	381	22	6.0%	61,988	450	31,769	17,970	19,052	1,083	6.0%
Continental Express	New York Newark	EWR	1,461	281	1,477	1,074	416	-658	-61.3%	71,279	29,271	71,969	53,017	20,784	-32,233	-60.8%
Continental Express/Chatauqua	Cleveland	CLE			684	922	879	-43	-4.7%			34,207	46,115	43,950	-2,165	-4.7%
Delta Connection/ASA	Atlanta	ATL	31	701	1,221	1,286	970	-316	-24.6%	1,522	37,065	67,115	80,322	67,288	-13,033	-16.2%
Delta Connection/ASA	Cincinnati	CVG	31	61	113	238	52	-186	-78.2%	1,522	3,031	7,188	12,081	2,598	-9,483	-78.5%
Delta Connection/Chautauqua	Cincinnati	CVG		13				-	-		537				-	-
Delta Connection/Chautauqua	New York JFK	JFK		225				-	-		8,331				-	-
Delta Connection/Comair	Atlanta	ATL			56	78	4	-74	-94.4%			2,815	3,897	303	-3,594	-92.2%
Delta Connection/Comair	Cincinnati	CVG	344	671	862	719	186	-533	-74.1%	17,618	39,663	45,855	37,758	10,089	-27,669	-73.3%
Delta Connection/Comair	Detroit	DTW					121	121	-					8,487	8,487	-
Delta Connection/Comair	New York JFK	JFK			329	593	91	-502	-84.7%			16,454	29,661	4,547	-25,114	-84.7%
Delta Connection/Freedom	Cincinnati	CVG				30	576	546	1800.0%				1,516	28,795	27,279	1800.0%
Delta Connection/Freedom	New York JFK	JFK				74		-74	-100.0%				3,681		-3,681	-100.0%
Delta Connection/Mesaba	Detroit	DTW					182	182	-					13,821	13,821	-
Delta Connection/Mesaba	Minneapolis	MSP					260	260	-					19,745	19,745	-
Delta Connection/Pinnacle	Atlanta	ATL					156	156	-					10,912	10,912	-
Delta Connection/Pinnacle	Detroit	DTW					69	69	-					3,464	3,464	-
Freedom	Atlanta	ATL			9			-	-			433			-	-
Freedom	New York JFK	JFK		312	905			-	-		11,535	33,484			-	-
Northwest Airlink/Mesaba	Detroit	DTW				113		-113	-100.0%				8,556		-8,556	-100.0%
Northwest Airlink/Mesaba	Minneapolis	MSP				268		-268	-100.0%				20,403		-20,403	-100.0%
Northwest Airlink/Pinnacle	Minneapolis	MSP	31					-	-	1,522					-	-
United Express	Chicago O'Hare	ORD	261	334	217	212	368	156	73.5%	18,270	23,339	14,843	14,003	24,291	10,288	73.5%
United Express	Washington Dulles	IAD	1,722	1,650	1,585	1,455	1,455	0	0.0%	85,912	84,825	89,995	88,332	90,341	2,009	2.3%
US Airways Express	Charlotte	CLT	17	338	364	472	91	-381	-80.7%	870	26,569	28,006	39,576	5,949	-33,627	-85.0%
US Airways Express	New York La Guardia	LGA	1,674	1,810	1,849	1,580	1,702	121	7.7%	55,132	59,460	57,277	53,398	62,963	9,565	17.9%
US Airways Express	Philadelphia	PHL	715	1,680	1,728	2,286	1,784	-502	-22.0%	45,048	105,137	123,046	178,279	123,487	-54,792	-30.7%
US Airways Express	Pittsburgh	PIT	1,365	1,390	979	303		-303	-100.0%	72,862	76,641	51,311	15,155		-15,155	-100.0%
US Airways Express	Washington National	DCA	484	624	1,251	1,468	1,251	-217	-14.7%	31,129	31,271	78,572	92,835	79,178	-13,657	-14.7%
Subtotal			12,672	13,961	18,355	17,420	14,185	-3,235	-18.6%	511,554	608,197	846,204	905,611	742,677	-162,934	-18.0%
Total			39,269	34,995	37,632	33,553	29,699	-3,854	-11.5%	4,311,560	3,482,333	3,441,203	3,075,473	2,776,119	-299,355	-9.7%

Source: OAG Schedules.

Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester Airport

Carrier	Market	Code	Departures 2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	Seats 2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																
Continental	Cleveland	CLE					9	9	-					1,031	1,031	-
Continental	New York Newark	EWR	288	260	4			-	-	31,076	27,019	450			-	-
Delta	Atlanta	ATL	671			13		-13	-100.0%	95,126			1,845		-1,845	-100.0%
Delta	Cincinnati	CVG	667					-	-	86,834					-	-
Delta	Detroit	DTW					775	775	-					93,086	93,086	-
Northwest	Detroit	DTW	1,404	1,295	1,195	827		-827	-100.0%	181,073	180,284	148,805	101,170		-101,170	-100.0%
Northwest	Minneapolis	MSP	366	238	152			-	-	46,980	30,258	18,792			-	-
Southwest	Baltimore	BWI	3,863	3,845	3,884	3,616	3,299	-316	-8.7%	527,946	523,458	528,637	493,317	448,908	-44,408	-9.0%
Southwest	Chicago Midway	MDW	1,360		1,624	1,641	1,247	-394	-24.0%	185,741		221,908	224,762	168,961	-55,801	-24.8%
Southwest	Fort Lauderdale/Hollywood	FLL				251	121	-130	-51.7%				34,341	16,610	-17,731	-51.6%
Southwest	Las Vegas	LAS	366	364	364	364	364	0	0.0%	50,060	49,830	49,830	49,830	49,830	0	0.0%
Southwest	Nashville	BNA	732	61				-	-	99,989	8,305				-	-
Southwest	Orlando	MCO	1,474	1,451	1,767	1,593	1,199	-394	-24.7%	201,431	198,725	241,965	218,171	164,059	-54,112	-24.8%
Southwest	Philadelphia	PHL	1,792	1,749	1,996	2,013	1,888	-126	-6.2%	244,609	239,657	273,097	268,179	258,380	-9,799	-3.7%
Southwest	Phoenix	PHX			121	364	364	0	0.0%			16,610	49,830	49,830	0	0.0%
Southwest	Tampa	TPA	1,103	1,091	1,026	736	671	-65	-8.8%	150,319	149,489	140,591	100,651	91,948	-8,703	-8.6%
United	Chicago O'Hare	ORD	1,343	1,091	1,061	818	606	-212	-25.9%	179,246	137,460	128,359	106,180	85,691	-20,490	-19.3%
US Airways	Charlotte	CLT	1,312	658	606	528	377	-152	-28.7%	179,003	90,887	83,630	72,484	53,467	-19,017	-26.2%
US Airways	Philadelphia	PHL	2,032	680	329	333	394	61	18.2%	275,085	94,901	45,517	45,439	56,039	10,600	23.3%
US Airways	Washington National	DCA	576	537	303	294		-294	-100.0%	77,334	77,316	43,568	40,451		-40,451	-100.0%
Subtotal			19,349	13,320	14,432	13,393	11,314	-2,078	-15.5%	2,611,852	1,807,589	1,941,758	1,806,649	1,537,838	-268,811	-14.9%
Regional/Commuter Carriers																
Air Georgian (AC)	Toronto	YYZ	933	905	914	905	905	0	0.0%	17,461	17,194	17,359	17,194	17,194	0	0.0%
America West Express/Mesa	Charlotte	CLT			260			-	-			22,343			-	-
Compass Airlines	Minneapolis	MSP			61			-	-			4,728			-	-
Continental Connection/CommutAir	Albany	ALB	314					-	-	5,951					-	-
Continental Express	Cleveland	CLE	1,190	1,208	1,230	1,204	1,173	-30	-2.5%	59,095	60,009	60,079	60,074	58,672	-1,403	-2.3%
Continental Express	New York Newark	EWR	1,168	1,191	1,446	1,373	1,065	-307	-22.4%	58,177	59,538	71,804	68,236	53,259	-14,977	-21.9%
Continental Connection/Colgan	New York Newark	EWR				61	338	277	457.1%				4,486	24,993	20,507	457.1%

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester Airport (Continued)

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Delta Connection/ASA	Atlanta	ATL	484	1,433	1,083	554	364	-191	-34.4%	26,492	94,091	75,775	38,797	25,460	-13,336	-34.4%
Delta Connection/ASA	Cincinnati	CVG	275		48	4		-4	-100.0%	13,702		3,334	217		-217	-100.0%
Delta Connection/Comair	Atlanta	ATL		182	91	134		-134	-100.0%		12,730	6,365	9,396		-9,396	-100.0%
Delta Connection/Comair	Cincinnati	CVG	462	983	931	766		-766	-100.0%	24,708	54,515	52,003	39,187		-39,187	-100.0%
Delta Connection/Comair	New York La Guardia	LGA	488					-	-	24,360					-	-
Delta Connection/Comair	New York JFK	JFK			61			-	-			3,031			-	-
Delta Connection/Mesaba	Detroit	DTW			22		290	290	-			1,645		22,048	22,048	-
Delta Connection/Mesaba	Minneapolis	MSP					91	91	-					6,911	6,911	-
Delta Connection/Pinnacle	Detroit	DTW					65	65	-					3,248	3,248	-
Freedom	New York JFK	JFK		450	996			-	-		16,662	38,650			-	-
Northwest Airlink/Compass	Detroit	DTW				30		-30	-100.0%				2,364		-2,364	-100.0%
Northwest Airlink/Mesaba	Detroit	DTW			22	364		-364	-100.0%			1,645	27,643		-27,643	-100.0%
Northwest Airlink/Mesaba	Minneapolis	MSP				268		-268	-100.0%				20,403		-20,403	-100.0%
Northwest Airlink/Pinnacle	Detroit	DTW		91	26			-	-		4,547	1,299			-	-
Northwest Airlink/Pinnacle	Minneapolis	MSP	235	91	91			-	-	11,745	4,547	4,547			-	-
United Express/Chautauqua	Washington Dulles	IAD	610	30				-	-	30,450	1,516				-	-
United Express/GoJet	Chicago O'Hare	ORD	31	242				-	-	2,132	16,974				-	-
United Express/Mesa	Washington Dulles	IAD	244	1,225	1,074	585	446	-139	-23.7%	14,616	61,356	58,057	35,809	26,803	-9,006	-25.2%
United Express/Mesa	Chicago O'Hare	ORD		91	364	320	385	65	20.3%		6,365	24,975	21,078	25,227	4,148	19.7%
United Express/Transtates	Washington Dulles	IAD	911	56	351	507	710	204	40.2%	45,457	2,815	17,537	25,331	35,506	10,176	40.2%
US Airways Express	Boston	BOS				74		-74	-100.0%				1,399		-1,399	-100.0%
US Airways Express	Charlotte	CLT			169	351	225	-126	-35.8%			12,453	29,617	19,364	-10,253	-34.6%
US Airways Express	New York La Guardia	LGA	2,507	2,446	2,446	2,143	1,459	-684	-31.9%	86,552	83,790	83,010	72,848	49,613	-23,235	-31.9%
US Airways Express	Philadelphia	PHL	562	2,113	2,018	1,897	1,923	26	1.4%	30,202	115,559	134,767	129,324	118,339	-10,985	-8.5%
US Airways Express	Pittsburgh	PIT	1,024					-	-	51,113					-	-
US Airways Express	Washington National	DCA	510	546	779	840	1,005	165	19.6%	25,448	35,186	55,259	57,909	75,922	18,013	31.1%
Subtotal			11,948	13,283	14,480	12,379	10,444	-1,936	-15.6%	527,661	647,393	750,666	661,312	562,558	-98,754	-14.9%
Total			31,297	26,603	28,911	25,772	21,758	-4,014	-15.6%	3,139,513	2,454,982	2,692,424	2,467,961	2,100,396	-367,565	-14.9%

Source: OAG Schedules.

Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																
AirTran	Atlanta	ATL					152	152	-					18,013	18,013	-
AirTran	Baltimore	BWI			585	1,005	944	-61	-6.0%			68,392	117,534	110,497	-7,036	-6.0%
AirTran	Orlando	MCO			91	156	91	-65	-41.7%			10,639	18,351	11,089	-7,261	-39.6%
Continental	Cleveland	CLE					9	9	-					1,342	1,342	-
Delta	Atlanta	ATL	488			117	113	-4	-3.7%	61,387			16,601	15,986	-615	-3.7%
Delta	Cincinnati	CVG	488	91				-	-	69,182	9,093				-	-
JetBlue	New York JFK	JFK		849	1,498	1,559	1,520	-39	-2.5%		118,815	181,340	181,098	177,097	-4,001	-2.2%
JetBlue	Orlando	MCO				294	286	-9	-2.9%				29,444	28,578	-866	-2.9%
Northwest	Detroit	DTW	427	610	303			-	-	42,630	61,053	30,310			-	-
US Airways	Charlotte	CLT					121	121	-					10,669	10,669	-
US Airways	Philadelphia	PHL	152					-	-	19,183					-	-
US Airways	Washington National	DCA	52					-	-	6,656					-	-
Subtotal			1,607	1,550	2,477	3,131	3,235	104	3.3%	199,038	188,961	290,682	363,027	373,272	10,245	2.8%
Regional/Commuter Carriers																
America West Express/Mesa	Charlotte	CLT			251			-	-			21,598			-	-
Continental Connection/Colgan	New York Newark	EWR				710	1,407	697	98.2%				52,549	104,137	51,588	98.2%
Continental Connection/CommutAir	Albany	ALB	296					-	-	5,620					-	-
Continental Connection/CommutAir	Boston	BOS	74					-	-	1,405					-	-
Continental Express	Cleveland	CLE	222	208	234	320	273	-48	-14.9%	10,979	10,392	11,072	16,021	13,640	-2,382	-14.9%
Continental Express	New York Newark	EWR	1,400	1,416	1,433	745	13	-732	-98.3%	69,704	70,796	71,662	36,788	650	-36,138	-98.2%
Delta Connection/ASA	Atlanta	ATL			1,052	719	528	-191	-26.5%			73,653	50,141	36,978	-13,163	-26.3%
Delta Connection/ASA	Cincinnati	CVG				9		-9	-100.0%				433		-433	-100.0%
Delta Connection/Atlantic Coast Jet	Atlanta	ATL	702	1,364				-	-	48,416	95,477				-	-
Delta Connection/Atlantic Coast Jet	Cincinnati	CVG	31	940				-	-	1,522	49,752				-	-
Delta Connection/Chautauqua	Cincinnati	CVG			416			-	-			17,970			-	-
Delta Connection/Chautauqua	New York	JFK					9	9	-					433	433	-
Delta Connection/Comair	Boston	BOS	1,160					-	-	57,855					-	-
Delta Connection/Comair	Cincinnati	CVG	571		589	598		-598	-100.0%	29,624		29,444	30,050		-30,050	-100.0%
Delta Connection/Comair	Detroit	DTW					35	35	-					2,338	2,338	-
Delta Connection/Comair	New York JFK	JFK			385	502	814	312	62.1%			19,269	25,114	40,702	15,588	62.1%
Delta Connection/Comair	New York La Guardia	LGA	1,099	996	585			-	-	54,810	49,795	29,228			-	-
Delta Connection/Freedom	Cincinnati	CVG				95		-95	-100.0%				4,763		-4,763	-100.0%
Delta Connection/Freedom	New York JFK	JFK				762	459	-303	-39.8%				40,009	22,949	-17,060	-42.6%
Delta Connection/Mesaba	Detroit	DTW	388	30	52		416	416	-	26,713	2,091	3,949	58,853	31,592	-27,262	-46.3%
Delta Connection/Pinnacle	Atlanta	ATL				61	212	152	250.0%				4,243	14,852	10,609	250.0%
Delta Connection/Pinnacle	Detroit	DTW					541	541	-					27,063	27,063	-
Delta Connection/Pinnacle	Minneapolis	MSP					30	30	-					1,516	1,516	-
Freedom	Cincinnati	CVG			4			-	-			217			-	-
Freedom	New York JFK	JFK		443	1,000		459	459	-		16,021	45,396		22,949	22,949	-
Northwest Airlink/Mesaba	Detroit	DTW	388	30	52	801		-801	-100.0%	26,713	2,091	3,949	58,853	31,592	-27,262	-46.3%
Northwest Airlink/Mesaba	Minneapolis	MSP				91		-91	-100.0%				4,547		-4,547	-100.0%
Northwest Airlink/Pinnacle	Detroit	DTW	532	294	533	39		-39	-100.0%	26,535	14,722	26,630	1,949		-1,949	-100.0%
Northwest Airlink/Pinnacle	Minneapolis	MSP	405	91	121	30		-30	-100.0%	20,227	4,547	6,062	1,516		-1,516	-100.0%
Starlink Aviation	Yarmouth	YQI					390	390	-					7,015	7,015	-
United Express	Chicago O'Hare	ORD	1,099	1,247	1,260	1,247	1,251	4	0.3%	67,599	87,293	84,998	82,166	82,313	147	0.2%
United Express	Washington Dulles	IAD	1,461	1,403	1,108	1,065	1,095	30	2.8%	83,738	92,575	70,683	67,600	67,591	-9	0.0%
US Airways Express	Charlotte	CLT	366	429	113	537	381	-156	-29.0%	23,751	30,821	9,682	45,811	32,769	-13,042	-28.5%
US Airways Express	New York La Guardia	LGA	1,670	1,836	1,762	1,927	1,866	-61	-3.1%	77,987	89,432	84,063	93,796	92,692	-1,104	-1.2%
US Airways Express	Philadelphia	PHL	1,923	2,139	2,035	1,987	1,884	-104	-5.2%	100,607	112,571	120,911	123,851	134,230	10,379	8.4%
US Airways Express	Pittsburgh	PIT	218					-	-	10,874					-	-
US Airways Express	Washington National	DCA	1,151	1,169	1,373	1,563	1,108	-455	-29.1%	75,603	77,316	85,492	94,974	78,053	-16,922	-17.8%
Subtotal			15,156	14,034	14,358	13,808	13,172	-637	-4.6%	820,282	805,691	815,924	894,028	846,052	-47,976	-5.4%
Total			16,763	15,584	16,835	16,939	16,406	-533	-3.1%	1,019,320	994,652	1,106,605	1,257,055	1,219,324	-37,732	-3.0%

Source: OAG Schedules.
Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-7 Scheduled Passenger Operations by Market and Carrier for Burlington Airport

Carrier	Market	Code	Departures 2005	Departures 2006	Departures 2007	Departures 2008	Departures 2009	Departures 08-'09 Change	Departures 08-'09 Pct. Change	Seats 2005	Seats 2006	Seats 2007	Seats 2008	Seats 2009	Seats 08-'09 Change	Seats 08-'09 Pct. Change
Jet Carriers																
AirTran	Baltimore	BWI				507	606	100	19.7%				59,273	70,925	11,652	19.7%
JetBlue	New York J F Kennedy	JFK	1,129	1,455	1,490	1,468	1,494	26	1.8%	174,052	220,899	231,395	224,623	218,882	-5,742	-2.6%
JetBlue	Orlando	MCO				359	316	-43	-12.0%				41,516	37,671	-3,845	-9.3%
United	Chicago O'Hare	ORD	366	424	650	628	91	-537	-85.5%	42,404	54,558	78,988	77,135	11,145	-65,989	-85.6%
Northwest	Detroit	DTW	174					-	-	17,400					-	-
US Airways	Philadelphia	PHL	366	364	182			-	-	46,223	43,932	21,823			-	-
US Airways	Washington National	DCA	4					-	-	548					-	-
Subtotal			2,039	2,243	2,321	2,962	2,507	-455	-15.4%	280,627	319,389	332,206	402,547	338,623	-63,924	-15.9%
Regional/Commuter Carriers																
Big Sky Airlines	Boston	BOS			242			-	-			4,607			-	-
Continental Express	Cleveland	CLE	510	537	611	611	368	-242	-39.7%	25,334	26,846	28,331	29,457	18,403	-11,054	-37.5%
Continental Express	New York Newark	EWR	1,461	1,442	1,446	879	455	-424	-48.3%	72,806	72,095	71,129	43,443	22,733	-20,710	-47.7%
Continental Express/Colgan	New York Newark	EWR				567	970	403	71.0%				41,975	71,774	29,799	71.0%
Continental Express/CommutAir	Boston	BOS	632	979	208			-	-	11,984	18,593	3,949			-	-
Continental Express/CommutAir	Plattsburgh	PLB	366	580	178			-	-	6,942	11,024	3,373			-	-
Continental Express/CommutAir	Plattsburgh AFB	PBG			30			-	-			576			-	-
Delta Connection	Atlanta	ATL	61	697				-	-	3,044	34,857				-	-
Delta Connection/ASA	Atlanta	ATL			585	472	303	-169	-35.8%			31,999	33,038	21,217	-11,821	-35.8%
Delta Connection/Big Sky	Boston	BOS				121		-121	-100.0%				2,304		-2,304	-100.0%
Delta Connection/Comair	Atlanta	ATL			30	30		-30	-100.0%			1,516	2,122		-2,122	-100.0%
Delta Connection/Comair	Boston	BOS	1,007					-	-	50,242					-	-
Delta Connection/Comair	Cincinnati	CVG	1,064	650	364	152		-152	-100.0%	53,070	31,479	18,186	7,578		-7,578	-100.0%
Delta Connection/Comair	New York JFK	JFK		199	693	892	862	-30	-3.4%		9,959	34,640	44,599	43,690	-909	-2.0%
Delta Connection/Freedom	New York JFK	JFK		377	667	351	316	-35	-9.9%		13,938	27,993	17,537	15,805	-1,732	-9.9%
Delta Connection/Pinnacle	Detroit	DTW					879	879	-					43,950	43,950	-
Northwest Airlink/Mesaba	Detroit	DTW	214	481				-	-	14,707	33,163				-	-
Northwest Airlink/Pinnacle	Detroit	DTW	950	602	862	818		-818	-100.0%	47,415	30,094	43,084	40,919		-40,919	-100.0%
Northwest Airlink/Pinnacle	Minneapolis	MSP	61	61	91	91		-91	-100.0%	3,044	3,031	4,547	4,547		-4,547	-100.0%
United Express	Chicago O'Hare	ORD	1,007	961	727	615	1,091	476	77.5%	59,987	67,288	49,120	40,304	70,215	29,912	74.2%
United Express	Washington Dulles	IAD	1,461	1,451	1,399	1,303	1,191	-113	-8.6%	72,862	72,528	71,662	66,621	62,932	-3,689	-5.5%
US Airways Express	Charlotte	CLT		4		13		-13	-100.0%		217		650		-650	-100.0%
US Airways Express	New York La Guardia	LGA	2,184	2,373	2,269	2,169	2,148	-22	-1.0%	80,636	87,795	83,950	80,265	79,464	-801	-1.0%
US Airways Express	Philadelphia	PHL	1,988	1,680	1,741	2,074	1,888	-186	-9.0%	97,453	87,808	95,373	121,833	116,854	-4,980	-4.1%
US Airways Express	Washington National	DCA	994	996	1,091	1,217	1,074	-143	-11.7%	61,457	57,970	69,973	79,932	65,513	-14,419	-18.0%
Subtotal			13,960	14,070	13,233	12,375	11,544	-831	-6.7%	660,983	658,685	644,005	657,121	632,548	-24,573	-3.7%
Total			15,999	16,313	15,554	15,337	14,051	-1,286	-8.4%	941,610	978,074	976,211	1,059,668	971,171	-88,497	-8.4%

Source: OAG Schedules.
Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-8 Scheduled Passenger Operations by Market and Carrier for Bangor Airport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																
Allegiant Air	Sanford	SFB			17	108	160	52	47.8%			2,598	16,238	24,000	7,763	47.8%
Allegiant Air	St. Petersburg/Clearwater	PIE					12	12	-					1,800	1,800	-
Subtotal			0	0	17	108	172	64	58.9%	0	0	2,598	16,238	25,800	9,563	58.9%
Regional/Commuter Carriers																
American Eagle	Boston	BOS	1,535	1,485	1,044			-	-	56,654	55,983	38,611			-	-
American Eagle	New York La Guardia	LGA	519	407	338			-	-	19,153	15,060	12,496			-	-
Big Sky Airlines	Boston	BOS			1,143			-	-			21,719			-	-
Continental Connection/CommutAir	Albany	ALB	192					-	-	3,637					-	-
Continental Connection/CommutAir	New York Newark	EWR	480	559				-	-	22,568	23,707				-	-
Continental Express	New York Newark	EWR			437	546	407	-139	-25.4%			17,420	25,421	20,351	-5,070	-19.9%
Delta Connection/ASA	Atlanta	ATL		212	507	273		-273	-100.0%		14,852	35,463	19,095		-19,095	-100.0%
Delta Connection/Big Sky	Boston	BOS				342		-342	-100.0%				6,499		-6,499	-100.0%
Delta Connection/Comair	Boston	BOS	1,421	1,035	251	749	554	-195	-26.0%	70,905	51,180	12,557	37,455	27,712	-9,743	-26.0%
Delta Connection/Comair	Cincinnati	CVG	1,400	675	693	126		-126	-100.0%	82,607	35,160	34,640	6,279		-6,279	-100.0%
Delta Connection/Comair	Detroit	DTW					48	48	-					2,382	2,382	-
Delta Connection/Comair	New York JFK	JFK				338	940	602	178.2%				16,887	46,981	30,094	178.2%
Delta Connection/Mesaba	Minneapolis	MSP					9	9	-					658	658	-
Delta Connection/Pinnacle	Detroit	DTW					680	680	-					33,991	33,991	-
Delta Connection/Pinnacle	Minneapolis	MSP					4	4	-					217	217	-
Northwest Airlink/Pinnacle	Detroit	DTW	1,016	818	818	814		-814	-100.0%	55,306	42,646	40,919	40,702		-40,702	-100.0%
Northwest Airlink/Pinnacle	Minneapolis	MSP	61	13	13	13		-13	-100.0%	3,045	650	650	650		-650	-100.0%
US Airways Express	New York La Guardia	LGA	160		126	268	706	437	162.9%	7,830		6,279	13,423	27,465	14,042	104.6%
US Airways Express	Philadelphia	PHL	1,182	1,121	1,074	1,078	1,121	43	4.0%	58,943	56,076	60,594	59,243	58,481	-762	-1.3%
US Airways Express	Washington National	DCA				13	22	9	66.7%				650	1,083	433	66.7%
Subtotal			7,966	6,325	6,443	4,559	4,490	-69	-1.5%	380,648	295,314	281,347	226,303	219,319	-6,984	-3.1%
Total			7,966	6,325	6,461	4,668	4,662	-6	-0.1%	380,648	295,314	283,945	242,541	245,119	2,578	1.1%

Source: OAG Schedules.
Note: Allegiant stopped reporting to the OAG in 2009, so 2009 statistics from the T100 database.
Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-9 Scheduled Passenger Operations by Market and Carrier for Tweed-New Haven Airport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Regional/Commuter Carriers																
Pan Am Clipper Connection	Baltimore	BWI			277			-	-			4,988			-	-
Pan Am Clipper Connection	Bedford	BED			113			-	-			2,026			-	-
Pan Am Clipper Connection	Elmira/Corning	ELM			152			-	-			2,728			-	-
Pan Am Clipper Connection	Portsmouth	PSM			56			-	-			1,013			-	-
Delta Connection/Comair	Cincinnati	CVG	1,029					-	-	51,330					-	-
US Airways Express	Philadelphia	PHL	1,910	2,071	1,697	1,624	1,580	-43	-2.7%	76,255	77,477	62,971	60,360	58,814	-1,546	-2.6%
Total			2,939	2,071	2,295	1,624	1,580	-43	-2.7%	127,585	77,477	73,727	60,360	58,814	-1,546	-2.6%

Source: OAG Schedules.

Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-10 Scheduled Passenger Operations by Market and Carrier for Worcester Regional Airport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Regional/Commuter Carriers																
Allegiant Air	Orlando/Sanford	SFB		181	17			-	-		27,279	2,598			0	-
Direct Air	Myrtle Beach	MYR					63	63	-					8,743	8,743	-
Direct Air	Orlando/Sanford	SFB				17	139	122	717.6%				2,533	19,641	17,108	675.4%
Direct Air	Punta Gorda	PGD				17	66	49	288.2%				2,533	9,421	6,888	271.9%
US Airways Express	Philadelphia	PHL	4					-	-	596					-	-
Total			4	181	17	34	268	234	688.2%	596	27,279	2,598	5,066	37,805	32,739	646.2%

Sources: OAG Schedules; U.S. DOT, T100 Database.

Note: As Direct Air schedule not published in the OAG, all Direct Air statistics from the T100 database. Direct Air flights operated by Virgin America, Xtra Airways, USA Jet, and Falcon Air Express.

Note: 2009 Delta Figures Include all 2009 Northwest Operations

Table F-11 Scheduled Passenger Operations by Market and Carrier for Hanscom Field

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Regional/Commuter Carriers																
Pan Am Clipper Connection	Elmira/Corning	ELM	9		390			-	-	157		7,015			-	-
Pan Am Clipper Connection	New Haven	HVN	192	251	113			-	-	3,445	4,520	2,026			-	-
Pan Am Clipper Connection	New London/Groton	GON	9					-	-	157					-	-
Pan Am Clipper Connection	Portsmouth	PSM	192	251	221	26		-26	-100.0%	3,445	4,520	3,975	468		-468	-100.0%
Pan Am Clipper Connection	Trenton	TTN		982	1,048	26		-26	-100.0%		17,692	18,861	468		-468	-100.0%
Shuttle America	Trenton	TTN	863					-	-	15,503					-	-
Total			1,265	1,484	1,772	52	0	-52	-100.0%	22,707	26,732	31,877	935	0	-935	-100.0%

Table F-12 Scheduled Passenger Operations by Market and Carrier for Portsmouth International Airport

			Departures							Seats						
Carrier	Market	Code	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change	2005	2006	2007	2008	2009	08-'09 Change	08-'09 Pct. Change
Jet Carriers																
Alliegiant Airways	Orlando/Sanford	SFB	35	191	34			-	-	5,220	28,578	5,100			-	-
Skybus	Columbus	CMH			409	108		-108	-100.0%			58,896	15,552		-15,552	-100.0%
Skybus	Greensboro	GSO				83		-83	-100.0%				11,952		-11,952	-100.0%
Skybus	Punta Gorda	PGD			15	59		-59	-100.0%			2,160	8,496		-8,496	-100.0%
Skybus	Saint Augustine	UST			14	56		-56	-100.0%			2,016	8,064		-8,064	-100.0%
Subtotal			35	191	472	306	0	-306	-100.0%	5,220	28,578	68,172	44,064	0	-44,064	-100.0%
Regional/Commuter Carriers																
Pan Am Clipper Connection	Bedford	BED	170	221	196	9		-9	-100.0%	3,053	3,975	3,724	156		-156	-100.0%
Pan Am Clipper Connection	Fort Lauderdale/Hollywood	FLL	13					-	-	1,957					-	-
Pan Am Clipper Connection	Hartford	BDL	13					-	-	1,957					-	-
Pan Am Clipper Connection	Newburgh	SWF	48					-	-	7,178					-	-
Pan Am Clipper Connection	New Haven	HVN			8			-	-	7,178		152			-	-
Pan Am Clipper Connection	Sanford	SFB	57					-	-	8,483					-	-
Pan Am Clipper Connection	Trenton	TTN	22		1			-	-	391		19			-	-
Pan Am Clipper Connection	Westchester County	HPN						-	-						-	-
Subtotal			323	221	205	9	0	-9	-100.0%	30,197	3,975	3,895	156	0	-156	-100.0%
Total			358	412	677	315	0	-315	-100.0%	35,417	32,553	72,067	44,220	0	-44,220	-100.0%

Sources: OAG Schedules; U.S. DOT, T100 Database.

Note: Skybus did not report to the OAG, so all 2007 and 2008 Skybus statistics from the T100 database. Updated 2007 carrier statistics used.

Note: 2009 Delta Figures Include all 2009 Northwest Operations

G

Ground Transportation

This appendix provides information in support of *Chapter 5, Ground Transportation*:

- Table G-1 Logan Express Bus Service Ridership
- Table G-2 Water Transportation Services Ridership
- Table G-3 Massachusetts Bay Transportation Authority (MBTA) Airport Station Passengers
- Table G-4 Annual Taxi Dispatches (Tickets Sold)
- Table G-5 Logan Airport Employee Parking Supply
- Table G-6 Logan Airport Commercial Parking Supply
- Table G-7 2009 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment, and Vehicle Miles Traveled (VMT) Summary
- 2009 Traffic Roadway Network
- March 2009 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection
- September 2009 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection

Table G-1 Logan Express Bus Service Ridership

	Ridership			Percent Change		
Service Year	Air Passengers	Employees	Total	Air Passengers	Employees	Total
Framingham						
1992	207,847	7,573	215,420	4.3%	21.3%	4.8%
1993	229,064	12,307	241,371	10.2%	62.5%	12.0%
1994	250,342	17,352	267,694	9.3%	41.0%	10.9%
1995	274,754	21,129	295,883	9.8%	21.8%	10.5%
1996	325,665	22,932	348,597	18.5%	8.5%	17.8%
1997	316,306	29,871	346,175	(2.9)%	30.3%	(0.7)%
1999	345,715	31,946	380,661	3.5%	(6.0)%	2.6%
2000	371,560	34,508	406,068	6.6%	8.0%	6.7%
2001	354,521	38,740	393,261	(4.6)%	12.3%	(3.2)%
2002	342,746	42,441	385,187	(3.3)%	8.7%	(2.1)%
2003	310,024	55,979	366,003	(9.5)%	31.9%	(5.0)%
2004	323,931	54,763	378,694	4.5%	(2.2%)	3.5%
2005	318,125	57,569	375,694	(1.8%)	5.1%	(0.8%)
2006	349,022	60,764	409,789	9.7%	5.5%	9.1%
2007	311,299	57,252	368,551	(2.1%)[5]	(0.6%)[5]	(1.9%)[5]
2008	276,112	57,797	333,909	(11.3%)	1.0%	(11.4%)
2009	264,233	59,840	324,073	(4.3%)	3.5%	(2.9%)
Braintree[1]						
1992	186,217	9,694	195,911	10.6%	16.6%	10.8%
1993	205,209	22,768	227,977	10.2%	134.9%	16.4%
1994	247,636	37,489	285,125	20.7%	64.7%	25.1%
1995	264,579	70,723	335,302	6.8%	88.7%	17.6%
1996	335,232	103,519	438,751	26.7%	46.4%	30.1%
1997	300,006	135,340	435,346	(10.5)%	30.7%	(0.8)%
1999	328,818	125,286	454,105	9.6%	(19.7)%	(0.5)%
2000	355,932	149,687	505,619	8.2%	19.5%	11.3%
2001	345,249	156,240	501,489	(3.0)%	4.4%	(0.8)%
2002	323,115	190,360	513,475	(6.4)%	21.8%	2.4%
2003	301,013	216,765	517,778	(6.8)%	13.9%	0.8%
2004	318,100	208,566	526,666	5.7%	(3.8%)	1.7%
2005	307,659	189,531	497,190	(3.2%)	(9.1%)	(5.5%)
2006	333,413	202,983	536,396	8.4%	7.1%	7.9%
2007	300,715	196,955	497,670	(2.3%)[5]	3.9%[5]	0.1%[5]
2008	252,289	221,591	473,880	(16.1%)	12.5%	(4.8%)
2009	231,151	234,908	466,059	(8.4%)	6.0%	(1.7%)
Woburn[2]						
1992[3]	3,052	91	3,143	NA	NA	-
1993	59,635	5,027	64,662	NA	NA	-
1994	119,567	9,082	128,649	100.5%	80.7%	99.0%
1995	150,147	13,376	163,523	25.6%	47.3%	27.1%
1996	190,566	17,322	207,888	26.9%	29.5%	27.1%
1997	199,715	20,018	219,733	4.8%	15.6%	5.7%
1998	208,286	22,876	231,162	4.3%	14.3%	5.2%
1999	191,454	23,495	214,949	(8.1)%	2.7%	(7.0)%
2000	195,744	27,522	223,266	2.2%	17.1%	3.9%
2001	177,375	38,318	215,530	(9.4)%	39.2%	(3.4)%
2002	161,145	73,277	234,422	(9.2)%	91.0%	8.7%
2003	164,980	103,963	268,943	(2.4)%	41.9%	14.7%

Table G-1 Logan Express Bus Service Ridership (Continued)

	Ridership			Percent Change		
Service Year	Air Passengers	Employees	Total	Air Passengers	Employees	Total
Woburn (cont.)						
2004	172,110	111,326	283,436	4.3%	7.1%	5.4%
2005	163,227	110,961	274,188	(5.1%)	(0.3%)	(3.2%)
2006	167,341	121,672	289,013	2.5%	9.7%	5.4%
2007	149,149	123,066	272,215	(8.6%)[5]	10.9%[5]	(0.7%)[5]
2008	129,385	122,777	252,162	(13.3%)	(0.2%)	(7.4%)
2009	**113,607**	**121,633**	**235,240**	**(12.2%)**	**(0.9%)**	**(6.7%)**
Peabody						
2001[4]	8,151	3,097	11,248	NA	NA	NA
2002	28,626	20,629	49,255	NA	NA	NA
2003	32,318	23,425	55,743	21.4%	13.6%	13.2%
2004	43,389	33,642	77,031	34.3%	43.6%	38.2%
2005	51,023	39,599	87,622	17.6%	17.7%	13.7%
2006	42,142	32,632	74,774	(17.4%)	(17.6%)	(14.7%)
2007	36,367	26,949	63,316	(28.7%)[5]	(31.9%)[5]	(27.7%)[5]
2008	30,887	30,596	61,483	(15.1%)	13.5%	(2.9%)
2009	**27,856**	**32,220**	**60,076**	**(9.8%)**	**5.3%**	**(2.3%)**
Total System Ridership						
1992	397,116	17,358	414,474	8.0%	19.2%	8.5%
1993	493,908	39,832	533,740	24.4%	129.5%	28.8%
1994	617,545	63,923	681,468	25.0%	60.5%	27.7%
1995	689,480	105,228	794,708	11.6%	64.6%	16.6%
1996	851,463	143,773	995,236	23.4%	36.6%	25.2%
1997	816,015	185,229	1,001,254	(4.2)%	28.8%	0.6%
1998	845,598	212,952	1,058,550	3.6%	15.0%	5.7%
1999	868,987	180,727	1,049,714	2.7%	(15.2)%	(0.8)%
2000	923,236	211,717	1,134,953	6.2%	17.1%	8.1%
2001	885,296	236,395	1,121,691	(4.1)%	11.7%	(1.2)%
2002	855,632	326,707	1,182,339	(3.4)%	38.2%	5.4%
2003	808,335	400,132	1,208,467	(5.5%)	22.5%	2.2%
2004	857,530	408,297	1,265,827	6.1%	2.0%	2.2%
2005	837,034	397,660	1,234,694	(2.4%)	(2.6%)	(2.4%)
2006	891,918	418,051	1,309,969	6.6%	5.1%	6.1%
2007	797,530	404,222	1,201,752	(4.7%)[5]	1.7%[5]	(2.7%)[5]
2008	688,673	432,761	1,121,434	(13.6%)	7.1%	(6.7%)
2009	**636,847**	**448,601**	**1,085,448**	**(7.5%)**	**3.7%**	**(3.2%)**

NA Not applicable.
1 Service originally based from the Quincy-Adams Massachusetts Bay Transportation Authority (MBTA) Station.
2 Woburn Express moved from Mishawum Station to the Anderson Regional Transportation Center (ARTC) in Woburn in May 2001.
3 Reflects a partial year of operation; Woburn Logan Express service was implemented in November 1992.
4 Reflects a partial year of operation. The Peabody Logan Express service commenced in September 2001.
5 Percent comparison between 2007 and 2005. 2006 numbers elevated due to Ted Williams Tunnel closures in Fall 2006.

Table G-2 Water Transportation Services Ridership to and from Logan Airport

	Rowes Wharf/Fan Pier Water Shuttle	Private Water Taxi (on-demand)[2]	Harbor Express (Long Wharf/Quincy/Hull)	Boston-Logan Water Shuttle (Long Wharf)	Total
1990	181,530	NS	NS	NS	181,530
1991	142,500	NS	NS	NS	142,500
1992	133,297	NS	NS	NS	133,297
1993	159,525	NS	NS	NS	159,525
1994	209,057	NS	NS	NS	209,057
1995	203,829	NS	NS	NS	203,829
1996	159,992	3,364	11,781	NS	175,137
1997	132,542	6,299	71,309	NS	210,150
1998	124,836	9,243	101,174	NS	235,253
1999	122,211	17,252	98,539	NS	238,002
2000	128,097	26,335	83,243	NS	237,675
2001	107,400	29,642	82,704	NS	219,746
2002	75,304	36,736	85,652	NS	197,692
2003	26,480[1]	35,724[3]	61,849	5,722[4]	129,775
2004	NS	54,540	57,788	3,202[5]	116,530
2005	NS	44,975	51,960	NS	96,935
2006	NS	63,639	70,998	NS	134,637
2007	NS	50,737	59,460	NS	110,197
2008	NS	48,630	48,003	NS	96,633
2009	**NS**	**50,734**	**37,861**	**NS**	**88,595**

NA Not available.
NS Not in service.
Source: Massport.
Note: Figures from 2003 – 2007 have been revised from previous documents.
1 Rowes Wharf Water Shuttle operated from January to June only in 2003.
2 Operates April-October only.
3 Operated from May to October only in 2003.
4 Long Wharf Boston-Logan Water Shuttle operated from August to December in 2003.
5 Joint operation with City Water Taxi began on August 16, 2003.

Table G-3 Massachusetts Bay Transportation Authority (MBTA) Airport Station Passengers

Year	Turnstile Count[1]	Percent Change
1990	2,854,317	-
1991	2,515,293	(11.9)%
1992	2,626,572	4.2%
1993	2,604,980	(0.8)%
1994	3,108,734	19.3%
1995	3,040,868	(2.2)%
1996	2,974,850	(2.2)%
1997[2]	2,774,268	(6.7)%
1998	2,850,367	2.7%
1999	2,974,045	4.3%
2000	3,019,086	1.5%
2001	2,896,638	(4.1)%
2002	2,670,594	(7.8)%
2003[3]	2,575,899	(3.6)%
2004	2,740,372	6.4%
2005	NA	NA
2006	NA	NA
2007[4]	2,524,079	--
2008[4]	3,647,394	56.7%
2009	3,750,549	5.3%

NA Not available.

Source: MBTA.

Note: Turnstile counts include both Logan Airport bound (turnstile exits) and non-Logan Airport bound (turnstile entrances) passengers.

1 As stated in the Logan Airport 1999 ESPR, Massport believes that ridership estimates through 2005 from the old Airport Station were actually understated because many travelers that were destined for the Airport with baggage had been observed to avoid the turnstiles and exit the old Airport Station via the wide gate (designed for handicapped access) that did not have the capability to count passengers.

2 Airport Station was closed on six weekends during September and October 1997 due to construction.

3 Airport Station was closed on eight weekend days during 2003.

4 Automated fare collection and new fare gates implemented beginning January 2007. Station access to Bremen Street Park opened June 2007. Exits are undercounted.

5 Exits are undercounted.

Table G-4 Annual Taxi Dispatches (Tickets Sold)

Year	Total[1]	Percent Change
1990	1,330,418	
1991	1,208,611	(9.2)%
1992	1,266,033	4.8%
1993	1,336,603	5.6%
1994	1,409,505	5.5%
1995	1,499,869	6.4%
1996	1,721,093	14.7%
1997	1,827,244	6.2%
1998	1,888,281	3.3%
1999	1,955,895	3.6%
2000	2,140,724	9.4%
2001	1,789,736	(16.4)%
2002	1,679,508	(6.2)%
2003	1,550,000	(7.7)%
2004	1,710,000	10.3%
2005	1,769,880	3.5%
2006	1,864,238	5.3%
2007	1,925,817	3.3%
2008	1,749,730	(9.1)%
2009	1,630,333	(6.8)%

Source: Previous EDR/ESPR Documentation
1 Represents yearly total of tickets sold

Table G-5 Logan Airport Employee Parking Supply (2009)

Location	Number of Spaces March 2008	September 2008	March 2009	September 2009
Terminal Area	788	803	843	884
North Service Area	817	1,150	770	773
Southwest Service Area	10	10	10	10
South Service Area	1,172	1,181	1,169	1,181
Total spaces in service	2,787	3,144	2,792	2,848
Total spaces out of service	586	229	581	525
Total employee spaces	3,373	3,373	3,373	3,373

Source: Logan Airport Parking Space Inventory submitted to Massachusetts Department of Environmental Protection (MassDEP), March and September 2009.
Note: Logan Airport Parking Freeze sets a limit of 17,319 commercial and 3,373 employee spaces at the Airport beginning in 2007.

Table G-6 Logan Airport Commercial Parking Supply (2009)

Location	Number of Spaces March 2008	September 2008	March 2009	September 2009
Terminal Area				
Central Garage and West Garage	10,392	10,210	10,443	10,250
Terminal B Garage	2,640	2,630	2,640	2,478
Citgo Valet Lot	0	0	0	175
Logan Airport Hilton	235	235	235	235
Terminal E1	270	268	270	270
Terminal E2	250	243	234	266
Signature (General Aviation)	35	35	35	35
North Service Area				
Economy Lot 2	950	563	598	628
Sky Chef Valet Lot	0	0	0	0
South Service Area				
Harborside Hyatt Conference Center and Hotel	249	241	258	258
Southwest Service Area Former USPS Site	416	416	416	416
Total spaces in service	15,437	14,841	15,129	15,011
Total spaces out of service	1,882	2,478	2,190	2,308
Total commercial spaces	17,319	17,319	17,319	17,319

Source: Logan Airport Parking Space Inventory submitted to MassDEP, March and September 2009.
Note: Logan Airport Parking Freeze sets a limit of 17,319 commercial and 3,373 employee spaces at the Airport beginning in 2007.

Table G-7 2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
1	750	35	861	630	5,491	11,440	122.31	89.43	780.00	1,625.00
2	1535	35	937	1,049	6,712	13,984	272.36	304.88	1,951.40	4,065.42
3	1080	35	1,797	1,679	12,204	25,424	367.66	343.49	2,496.17	5,200.36
4	361	35	934	704	5,047	10,515	63.86	48.17	345.08	718.92
5	721	30	946	979	7,156	14,909	129.20	133.70	977.22	2,035.88
6	1110	35	338	423	3,156	6,576	71.12	88.96	663.58	1,382.46
7	1035	35	625	558	4,000	8,333	122.48	109.35	784.07	1,633.47
8	992	30	1,260	1,970	14,907	31,057	236.81	370.09	2,800.78	5,834.96
9	851	30	1,319	1,204	9,028	18,809	212.53	194.07	1,455.14	3,031.54
10	366	30	941	1,596	12,024	25,051	65.25	110.61	833.51	1,736.49
11	189	20	319	374	2,883	6,006	11.42	13.39	103.19	214.99
12	892	30	1,121	1,057	7,918	16,497	189.43	178.58	1,337.74	2,786.96
13	209	20	197	147	1,110	2,312	7.81	5.82	43.93	91.53
14	169	20	197	147	1,110	2,312	6.32	4.71	35.52	74.01
15	50	15	9	3	29	61	0.09	0.03	0.28	0.58
16	226	20	188	144	1,081	2,251	8.05	6.16	46.25	96.35
17	168	20	353	413	3,203	6,674	11.23	13.13	101.93	212.34
18	472	20	360	424	3,203	6,674	32.17	37.90	286.36	596.59
19	225	20	207	126	1,081	2,251	8.80	5.38	46.05	95.93
20	50	15	2	10	29	61	0.01	0.10	0.28	0.58
21	580	25	50	129	901	1,876	5.52	14.19	98.93	206.11
22	620	25	139	80	766	1,596	16.27	9.45	89.94	187.37
23	315	20	70	56	344	717	4.16	3.32	20.52	42.75
24	1050	30	579	486	4,036	8,409	115.23	96.60	802.69	1,672.28
25	568	30	523	1,079	7,988	16,642	56.28	116.11	859.32	1,790.25
26	315	20	208	136	1,110	2,312	12.42	8.13	66.21	137.95
27	475	20	146	341	2,481	5,169	13.17	30.66	223.21	465.03
28	590	25	375	739	5,507	11,473	41.95	82.59	615.35	1,281.98
29	315	20	310	295	2,303	4,797	18.47	17.59	137.38	286.21
30	437	20	439	638	4,784	9,967	36.33	52.78	395.94	824.88
31	432	20	601	502	3,760	7,833	49.21	41.09	307.64	640.91
32	387	30	544	555	4,158	8,664	39.87	40.68	304.80	635.00
33	168	35	19	34	239	498	0.60	1.10	7.61	15.86
34	295	35	472	353	2,723	5,672	26.38	19.72	152.13	316.93
35	605	20	479	821	5,528	11,517	54.84	94.03	633.43	1,319.65
37	450	20	40	33	241	501	0.00	0.00	0.00	0.00
38	488	30	664	361	3,403	7,089	56.60	30.74	290.00	604.17

Table G-7 2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
39	98	30	192	548	3,404	7,091	3.57	10.17	63.18	131.62
40	470	20	286	272	2,124	4,426	25.48	24.25	189.10	393.95
41	96	30	573	1,276	8,911	18,564	10.42	23.19	162.01	337.53
42	64	15	15	55	257	536	0.18	0.67	3.12	6.50
43	67	30	555	1,256	8,653	18,028	7.04	15.94	109.81	228.76
44	64	30	56	25	257	536	0.68	0.30	3.12	6.50
45	154	30	531	1,306	8,911	18,564	15.50	38.09	259.89	541.45
46	351	30	404	1,005	6,702	13,963	26.83	66.79	445.55	928.23
47	222	20	128	301	2,208	4,601	5.37	12.67	92.85	193.44
48	327	20	414	313	2,431	5,064	25.64	19.38	150.53	313.60
49	366	30	747	623	5,131	10,689	51.76	43.18	355.64	740.92
50	58	20	403	575	4,333	9,026	4.42	6.32	47.59	99.15
51	0	-	675	560	4,104	8,550	0.00	0.00	0.00	0.00
52	168	20	420	604	4,333	9,026	13.36	19.20	137.86	287.21
53	0	-	598	309	2,723	5,672	0.00	0.00	0.00	0.00
54	176	20	474	258	2,431	5,064	15.80	8.58	81.02	168.79
56	181	30	404	1,005	6,702	13,963	13.83	34.44	229.76	478.66
58	383	30	743	630	5,131	10,689	53.87	45.69	372.16	775.34
59	443	30	817	1,610	11,035	22,990	68.57	135.08	925.85	1,928.86
60	438	30	1,218	887	7,561	15,752	101.05	73.57	627.23	1,306.73
61	313	35	145	257	1,897	3,952	8.61	15.22	112.44	234.26
62	125	30	1,073	630	5,664	11,801	25.40	14.92	134.10	279.37
63	185	30	535	1,172	7,784	16,217	18.75	41.08	272.74	568.21
64	315	25	282	438	3,251	6,773	16.83	26.11	193.94	404.05
65	173	25	195	208	1,667	3,472	6.38	6.81	54.60	113.76
65	440	25	195	208	1,667	3,472	16.23	17.32	138.88	289.33
66	150	20	278	208	1,808	3,768	7.89	5.92	51.38	107.03
67	200	25	447	488	3,895	8,114	16.94	18.48	147.52	307.33
197	476	25	44	55	2,288	4,935	3.98	4.99	206.24	429.66
68	1000	25	13	16	659	4,766	2.40	3.02	124.74	259.88
69	980	25	67	65	659	1,372	12.40	12.02	122.25	254.68
69	307	25	67	65	659	1,372	3.88	3.77	38.30	79.78
70	567	15	64	228	1,727	3,599	6.85	24.48	185.50	386.47
71	295	30	361	411	5,605	11,676	20.19	22.99	313.13	652.36
72	162	30	927	1,799	13,389	27,893	28.45	55.20	410.79	855.81
72	348	20	906	1,758	13,389	27,893	59.73	115.89	882.44	1,838.41
73	609	30	1,111	862	7,392	15,399	128.11	99.39	852.57	1,776.19
74	295	30	651	463	3,953	8,236	36.40	25.86	220.88	460.16

Table G-7	2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
75	555	30	459	399	3,438	7,163	48.27	41.92	361.43	752.97
76	443	30	518	1,147	8,255	17,198	43.46	96.24	692.60	1,442.92
77	425	30	397	597	5,134	10,695	31.98	48.09	413.23	860.90
78	272	25	147	182	1,826	3,804	7.59	9.39	94.07	195.97
79	579	30	250	415	3,308	6,891	27.42	45.54	362.73	755.68
80	230	25	209	247	2,485	5,176	9.08	10.78	108.23	225.49
81	402	30	74	74	579	1,206	5.67	5.61	44.08	91.83
82	650	30	398	295	2,860	5,957	49.01	36.27	352.02	733.38
83	236	30	384	491	3,887	8,097	17.18	21.95	173.72	361.92
83	98	30	384	491	3,887	8,097	7.14	9.11	72.14	150.29
84	629	30	718	1,588	11,934	24,862	85.59	189.18	1,421.68	2,961.83
85	463	30	437	954	7,486	15,597	38.32	83.66	656.48	1,367.67
86	251	30	284	643	4,448	9,266	13.52	30.55	211.43	440.47
87	1852	35	640	960	7,307	15,223	224.59	336.88	2,563.00	5,339.58
88	630	30	181	162	1,297	2,701	21.61	19.30	154.72	322.32
88	307	25	181	162	1,297	2,701	10.53	9.41	75.39	157.07
89	628	35	470	301	2,657	5,535	55.94	35.82	315.98	658.29
90	395	35	397	604	2,636	5,492	29.73	45.16	197.22	410.88
91	808	35	926	1,660	10,123	21,089	141.65	253.98	1,549.08	3,227.26
92	716	35	311	648	4,212	8,775	42.18	87.93	571.17	1,189.94
93	582	35	607	1,007	5,911	12,314	66.92	111.00	651.52	1,357.34
93	151	35	607	1,007	5,911	12,314	17.36	28.80	169.04	352.16
93	1075	35	607	1,007	5,911	12,314	123.60	205.02	1,203.41	2,507.11
94	768	50	311	648	4,212	8,775	45.24	94.32	612.65	1,276.36
95	1722	30	146	150	1,155	2,407	47.62	49.02	376.84	785.08
96	1615	30	212	337	2,731	5,690	64.95	103.13	835.41	1,740.43
97	1558	35	242	309	2,528	5,267	71.51	91.21	745.97	1,554.10
98	1449	35	560	492	3,873	8,069	153.57	135.15	1,062.93	2,214.44
99	1114	35	786	800	6,401	13,336	165.73	168.78	1,350.57	2,813.68
100	458	35	1,374	1,222	9,958	20,746	119.19	106.03	863.79	1,799.56
101	1255	30	602	421	3,557	7,410	143.10	99.95	845.42	1,761.29
102	369	25	922	805	6,434	13,404	64.44	56.27	449.63	936.74
103	391	25	913	799	6,383	13,297	67.60	59.16	472.65	984.69
106	249	25	202	773	2,694	5,613	9.51	36.44	127.06	264.72
107	77	25	39	181	610	1,271	0.56	2.64	8.90	18.53
108	185	15	46	46	247	515	1.62	1.62	8.66	18.05
109	263	25	76	77	509	1,060	3.77	3.83	25.34	52.79
111	200	20	64	65	418	871	2.43	2.47	15.83	32.99

Table G-7 2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
112	200	20	43	56	418	871	1.63	2.12	15.83	32.99
113	20	15	12	12	91	189	0.04	0.04	0.34	0.72
115	327	20	55	68	509	1,060	3.39	4.19	31.50	65.63
116	148	20	32	33	261	545	0.89	0.92	7.33	15.27
117	369	25	62	253	908	1,893	4.35	17.70	63.49	132.26
118	216	25	33	38	320	668	1.36	1.54	13.11	27.31
118	151	25	33	38	320	668	0.95	1.08	9.17	19.09
120	372	25	892	774	6,166	12,846	62.87	54.56	434.42	905.04
121	372	25	215	786	2,798	5,830	15.16	55.36	197.15	410.73
122	2801	25	344	696	3,935	8,199	182.74	369.29	2,087.70	4,349.37
123	2801	25	652	557	3,935	8,199	346.03	295.44	2,087.70	4,349.37
124	1150	25	665	862	3,782	7,879	144.80	187.78	823.70	1,716.03
125	1150	25	965	1,026	7,150	14,895	210.20	223.38	1,557.20	3,244.17
126	850	25	30	10	180	376	4.87	1.62	29.05	60.53
127	850	25	8	48	263	547	1.30	7.80	42.27	88.06
128	939	25	680	1,216	6,092	12,691	120.96	216.22	1,083.39	2,257.07
129	939	25	1,019	930	7,128	14,851	181.30	165.36	1,267.70	2,641.05
130	580	35	113	379	2,249	4,686	12.37	41.63	247.08	514.75
131	660	35	728	1,364	9,556	19,909	90.96	170.54	1,194.54	2,488.63
134	65	25	93	144	1,102	2,295	1.14	1.77	13.56	28.25
135	155	25	333	1,111	7,090	14,771	9.79	32.61	208.14	433.63
136	151	25	1,077	835	7,090	14,771	30.80	23.89	202.77	422.44
137	227	25	413	909	6,492	13,524	17.74	39.09	279.09	581.43
138	608	25	413	909	6,492	13,524	47.51	104.70	747.51	1,557.31
139	369	35	672	1,209	9,020	18,791	46.98	84.48	630.35	1,313.22
141	583	30	885	1,544	11,751	24,481	97.76	170.43	1,297.49	2,703.11
142	450	30	692	645	5,028	10,476	58.95	54.97	428.56	892.84
143	2325	25	53	70	408	850	23.16	31.01	179.66	374.29
144	2050	25	76	103	816	1,700	29.44	39.81	316.82	660.04
145	372	25	76	103	816	1,700	5.34	7.22	57.49	119.77
145	275	25	76	103	816	1,700	3.95	5.34	42.50	88.54
146	1317	25	196	455	3,252	6,774	48.98	113.47	811.04	1,689.67
147	1317	25	349	412	3,795	7,906	87.04	102.75	946.57	1,972.02
148	575	25	361	278	2,326	4,846	39.33	30.29	253.30	527.71
149	575	25	177	407	2,326	4,846	19.24	44.36	253.30	527.71
150	1119	25	95	81	1,067	2,223	20.18	17.20	226.14	471.12
151	1819	25	70	163	1,610	3,355	23.96	56.17	554.80	1,155.82
152	1358	25	395	423	3,795	7,906	101.70	108.77	976.04	2,033.41

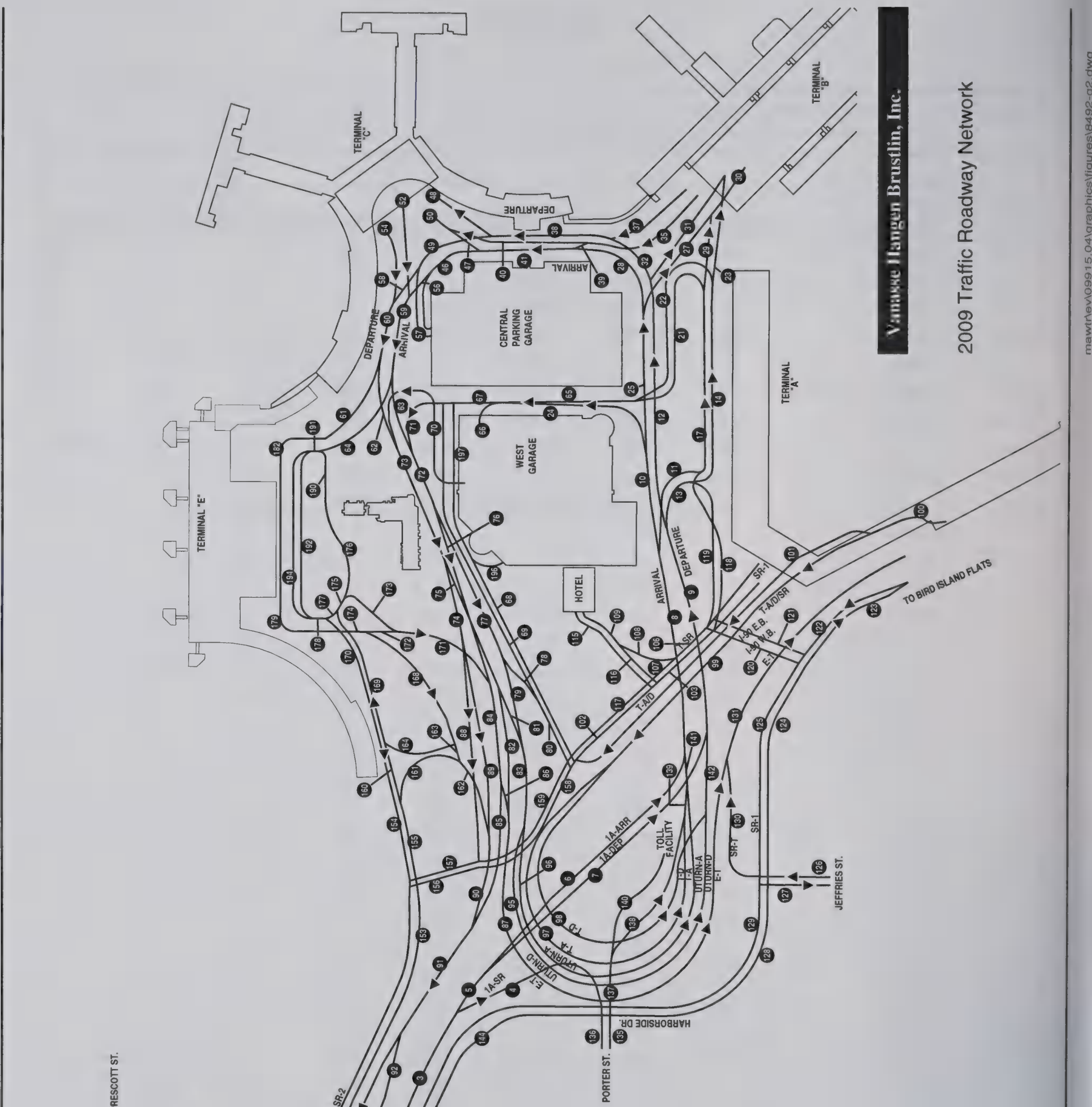
Table G-7 2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME AM Peak	VOLUME PM Peak	VOLUME High 8-Hour	VOLUME AWDT	VMT AM Peak	VMT PM Peak	VMT High 8-Hour	VMT AWDT
152	431	25	395	423	3,795	7,906	32.28	34.52	309.77	645.36
153	986	25	214	659	2,844	5,924	39.95	122.99	531.01	1,106.27
153	431	25	214	659	2,844	5,924	17.46	53.76	232.12	483.57
153	372	25	214	659	2,844	5,924	15.07	46.40	200.34	417.38
154	610	25	288	329	2,644	5,508	33.30	37.98	305.43	636.31
155	240	25	201	784	1,217	2,536	9.14	35.66	55.34	115.29
156	253	25	484	504	4,496	9,366	23.21	24.16	215.41	448.78
157	254	25	532	845	4,021	8,376	25.59	40.65	193.42	402.96
158	626	25	476	494	4,407	9,180	56.42	58.55	522.44	1,088.41
159	626	25	334	663	2,635	5,489	39.54	78.60	312.40	650.83
160	610	25	54	70	1,217	2,536	6.29	8.07	140.65	293.03
164	990	25	107	153	1,102	2,295	20.13	28.77	206.53	430.28
165	50	15	0	17	98	204	0.00	0.16	0.93	1.93
166	50	35	93	127	1,004	2,091	0.88	1.20	9.51	19.80
167	50	15	2	14	98	204	0.02	0.13	0.93	1.93
168	420	35	95	141	1,102	2,295	7.58	11.19	87.62	182.54
169	310	25	62	99	1,415	2,948	3.65	5.83	83.07	173.06
170	310	25	187	205	1,740	3,624	11.00	12.06	102.14	212.79
171	295	25	203	446	3,679	7,665	11.32	24.91	205.55	428.23
172	108	25	56	80	795	1,657	1.15	1.63	16.27	33.89
173	115	25	146	366	2,884	6,008	3.19	7.97	62.81	130.85
174	302	25	151	221	1,897	3,952	8.66	12.62	108.49	226.03
175	165	25	173	433	3,442	7,172	5.41	13.53	107.57	224.11
176	365	25	27	67	559	1,164	1.84	4.60	38.62	80.45
177	105	25	109	319	2,027	4,224	2.17	6.34	40.32	84.00
178	45	25	297	524	3,767	7,848	2.53	4.47	32.11	66.89
179	464	20	151	221	1,897	3,952	13.30	19.38	166.69	347.27
180	50	15	70	118	1,371	2,856	0.66	1.12	12.98	27.04
181	50	15	52	141	1,371	2,856	0.49	1.33	12.98	27.04
182	602	20	145	257	1,897	3,952	16.56	29.27	216.27	450.56
183	50	15	16	56	365	761	0.15	0.53	3.46	7.20
184	50	25	11	10	193	403	0.10	0.10	1.83	3.82
185	50	15	9	59	365	761	0.08	0.56	3.46	7.20
186	50	25	20	69	559	1,164	0.19	0.65	5.29	11.02
187	50	15	9	4	74	154	0.09	0.04	0.70	1.46

Table G-7 2009 Existing Conditions - Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
188	40	25	10	65	485	1,010	0.08	0.49	3.67	7.65
189	50	15	2	10	74	154	0.01	0.10	0.70	1.46
190	50	15	12	75	559	1,164	0.11	0.71	5.29	11.02
191	85	25	293	507	3,767	7,848	4.72	8.16	60.64	126.34
192	450	20	263	252	1,971	4,106	22.38	21.45	167.97	349.94
193	520	20	30	255	1,796	3,742	2.99	25.14	176.90	368.55
194	450	20	36	270	1,796	3,742	3.08	23.05	153.09	318.93
195	405	20	260	254	1,971	4,106	19.97	19.47	151.17	314.95
196	200	15	6	12	81	169	0.23	0.47	3.07	6.39
			LOGAN AIRPORT ITM VMT ANALYSIS:				8,098	10,379	74,612	155,442

AWDT = Average annual weekday daily traffic


Vanasse Hangen Brustlin, Inc.
2009 Traffic Roadway Network
TERMINAL "A"
TERMINAL "B"
TERMINAL "C"
TERMINAL "E"
CENTRAL PARKING GARAGE
WEST GARAGE
HOTEL
DEPARTURE
ARRIVAL
TOLL FACILITY
MBTA STATION
TO BIRD ISLAND FLATS
JEFFRIES ST.
HARBORSIDE DR.
PORTER ST.
PRESCOTT ST.
FRANKFORT ST.
ROUTE 1A N.
ROUTE 1A S.
FROM CALLAHAN TUNNEL
TO SUMNER TUNNEL
EGRESS-TAS
SR-2
I-90 E.B.
I-90 W.B.
1A-A/D
1A-SR
1A-ARR
1A-DEP
T-A/D
T-A/DSR
SR-1
SR
E-T
T-A
T-D
UTURN-A
UTURN-D
Not to Scale
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Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
Telephone (617) 428-2800
www.massport.com

March 2nd, 2009

Ms. Barbara Kwetz
Department of Environmental Protection
Division of Air Quality Control
One Winter Street
Boston, MA 02108

Re: March 2nd, 2009 Logan Airport Parking Space Inventory

Dear Ms. Kwetz:

In compliance with the reporting requirements of 310 CMR 7.30 (3)(d), enclosed are the following March 2nd , 2009 Massachusetts Port Authority submissions:

- Commercial Parking Space Inventory
- Employee Parking Space Inventory

We also continue to provide information on rental car spaces as a courtesy.

The attachments provide the quantity, physical distribution and allocation of commercial and employee parking spaces as defined by 310 CMR 7.30, as amended. These inventory tables are based on information provided to me by the Aviation Department's Ground Transportation Unit, as supplemented by field checks, and represent the most up to date information on parking at Logan International Airport as of March 2nd , 2009.

The Commercial Parking Space Inventory now totals 17,319 parking spaces (15,129 in service and 2,190 designated). The Employee Parking Space Inventory totals 3,373 employee parking spaces (2,792 in service and 581 designated). Designated spaces reflect parking spaces that are temporarily out of service. The total inventory of spaces at Logan Airport remains unchanged at 20,692. On-going construction in the North Cargo Area has affected the commercial and employee parking supply at this time. Further changes will be reflected in the September 2009 submission.

Massport's parking program remains in compliance with the Aviation and Transportation Security Act of 2001 (ATSA) and supplemental FAA security directives, and our top priority continues to be the safe and secure operation of our transportation and parking facilities. The Authority has also recently designated priority parking spaces for qualified alternative fuel vehicles. The Central and West Garages have a total of 80 such spaces and the Terminal B Garage has another 10 spaces.

The Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended. If you have any questions, please call me at (617) 568-3570.

Sincerely,

Craig Leiner

Craig Leiner
Economic Planning & Development Department

cc: C. Kirby
L. Dantas
S. Dalzell
I. Wallach
B. Desrosiers
D. Cook

Operating | Boston Logan International Airport • Port of Boston general cargo and passenger terminals • Tobin Memorial Bridge • Hanscom Field • Boston Fish Pier • Commonwealth Pier (site of the World Trade Center Boston) • Worcester Regional Airport

RECYCLED PAPER

Commercial Parking Space Inventory
Logan International Airport
March 1, 2009 Submission

In-Service Commercial Parking Spaces

Map ID#	Location of Commercial Parking Areas	Number of Spaces
C1a	Central Garage	7,289
C1b	West Garage	3,154
C2	Terminal B Garage	2,640
C3	Lot 3 (Former USPS site)	416
C4	Logan Airport Hilton	235
C5	Signature (General Aviation Terminal)	35
C6	Economy 2 / Satellite II Parking	598
C7a	Harborside Hyatt Conference Center & Hotel	258
C8a	Terminal E Lot 1	270
C8b	Terminal E Lot 2	234

Total In-Service Commercial Parking Spaces	**15,129**
Total Designated Commercial Parking Spaces	**2,190**
Total Commercial Parking Spaces	**17,319**
Total Employee Parking Spaces *(see table on next page)*	**3,373**
TOTAL PARKING FREEZE SPACES	**20,692**

In-Service Employee Parking Spaces

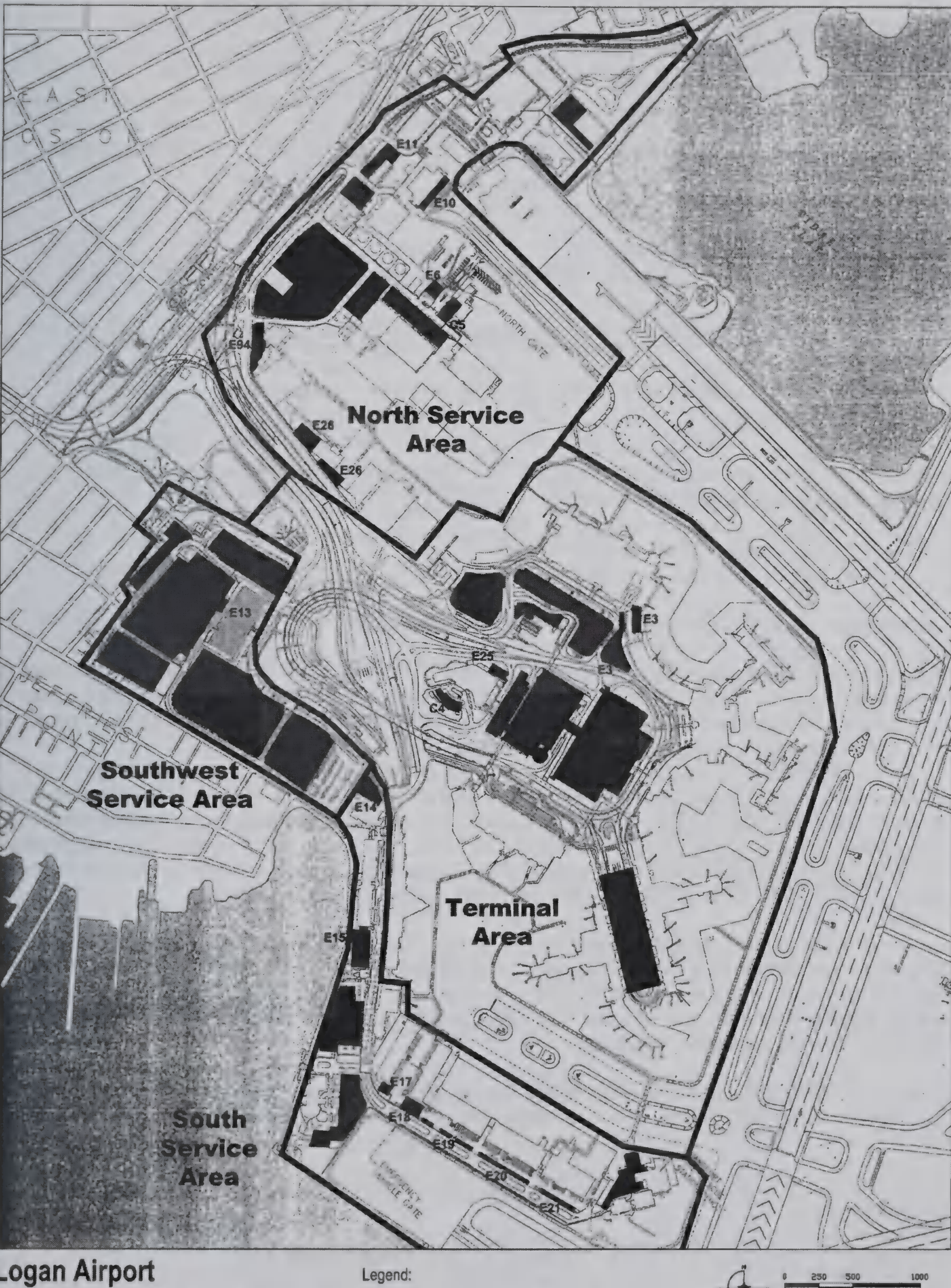
Map ID#	Location of Employee Parking Areas	Number of Spaces
E1	Central Parking / West Garage	79
E2	Massport Tower	489
E3	State Police / Old Term. D	151
E4	Massport Facilities 1 (Heating Plant)	94
E5	North Cargo Building 11	140
E6	North Gate & EMS Trailer	31
E7	North Cargo Building 7 (USPS trailer)	26
E8	North Cargo Building 8	112
E9	US Airways Administration	117
E10	Massport Facilities 2	35
E11	Massport Facilities 3	87
E12	LSG Sky Chefs	112
E13	Massport Taxi Pool	10
E14	Gate Gourmet	85
E15	Bird Island Flats (BIF) Garage	504
E16	Lot B	280
E17	South Cargo Building 63	16
E18	South Cargo Building 62	51
E19	South Cargo Building 58	23
E20	South Cargo Building 57	44
E21	South Cargo Building 56	72
E22	RJ / GA Terminal / Amelia Earhart Bldg.	89
E25	Hilton Hotel	30
E26	UPS	44
E94	Building 94 (United)	66
N/A	*ARFF Satellite Station* [1]	5

[1] This facility is located on the airfield and is not shown in the map.

Total In-Service Employee Parking Spaces	**2,792**
Total Designated Employee Parking Spaces	**581**
Total Employee Parking Spaces	**3,373**
Total Commercial Parking Spaces *(see table on previous page)*	**17,319**
TOTAL PARKING FREEZE SPACES	**20,692**

Supplemental Information: Rental Car Spaces Inventory
Logan International Airport
March 1, 2009 Submission

Map ID#	Number of Spaces
R1	1,027
R2	130
R3	1,016
R4	1,550
R5	960
R6	337
Total Rental Car Spaces	5,020



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Logan Airport
Parking Space Inventory

Logan International Airport
East Boston, MA

Massachusetts Port Authority
March 1, 2009

massport

Legend:

- Logan Parking Service Area Zones
- Commercial Parking Space Locations
- Employee Parking Space Locations
- Rental Car Parking Space Locations

Notes:

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Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
Telephone (617) 428-2800
www.massport.com

September 1st, 2009

Ms. Barbara Kwetz
Department of Environmental Protection
Division of Air Quality Control
One Winter Street
Boston, MA 02108

Re: September 1st, 2009 Logan Airport Parking Space Inventory

Dear Ms. Kwetz:

In compliance with the reporting requirements of 310 CMR 7.30 (3)(d), enclosed are the following Sept. 1st, 2009 Massachusetts Port Authority submissions:

- Commercial Parking Space Inventory
- Employee Parking Space Inventory

We also continue to provide information on rental car spaces as a courtesy.

The attachments provide the quantity, physical distribution and allocation of commercial and employee parking spaces as defined by 310 CMR 7.30, as amended. These inventory tables are based on information provided to me by the Aviation Department's Ground Transportation Unit, as supplemented by field checks, and represent the most up to date information on parking at Logan International Airport as of Sept. 1st, 2009.

The Commercial Parking Space Inventory now totals 17,319 parking spaces (15,011 in service and 2,308 designated). The Employee Parking Space Inventory totals 3,373 employee parking spaces (2,853 in service and 520 designated). Designated spaces reflect parking spaces that are temporarily out of service. The total inventory of spaces at Logan Airport remains unchanged at 20,692. Construction in the North Cargo Area is nearly complete; this involved the relocation of the State Police and TSA administrative offices.

Massport's parking program remains in compliance with the Aviation and Transportation Security Act of 2001 (ATSA) and supplemental FAA security directives, and our top priority continues to be the safe and secure operation of our transportation and parking facilities. The Authority has also recently designated priority parking spaces for qualified alternative fuel vehicles. The Central and West Garages have a total of 80 such spaces and the Terminal B Garage has another 10 spaces.

The Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended. If you have any questions, please call me at (617) 568-3570.

Sincerely,

Craig Leiner
Economic Planning & Development Department

cc: C. Kirby
L. Dantas
S. Dalzell
I. Wallach
B. Desrosiers
D. Cook

Operating | Boston Logan International Airport • Port of Boston general cargo and passenger terminals • Tobin Memorial Bridge • Hanscom Field • Boston Fish Pier • Commonwealth Pier (site of the World Trade Center Boston) • Worcester Regional Airport

RECYCLED PAPER

In-Service Commercial Parking Spaces

Map ID#	Location of Commercial Parking Areas	Number of Spaces
C1a	Central Garage	7,139
C1b	West Garage	3,111
C2	Terminal B Garage	2,478
C3	Lot 3 (Former USPS site)	416
C4	Logan Airport Hilton	235
C5	Signature (General Aviation Terminal)	35
C6	Economy Lot 2 / Satellite II Parking	628
C7a	Harborside Hyatt Conference Center & Hotel	258
C8a	Terminal E Lot 1	270
C8b	Terminal E Lot 2	266
C9	"Gulf Station" Lot	175

Total In-Service Commercial Parking Spaces	**15,011**
Total Designated Commercial Parking Spaces	**2,308**
Total Commercial Parking Spaces	**17,319**
Total Employee Parking Spaces *(see table on next page)*	**3,373**
TOTAL PARKING FREEZE SPACES	**20,692**

In-Service Employee Parking Spaces

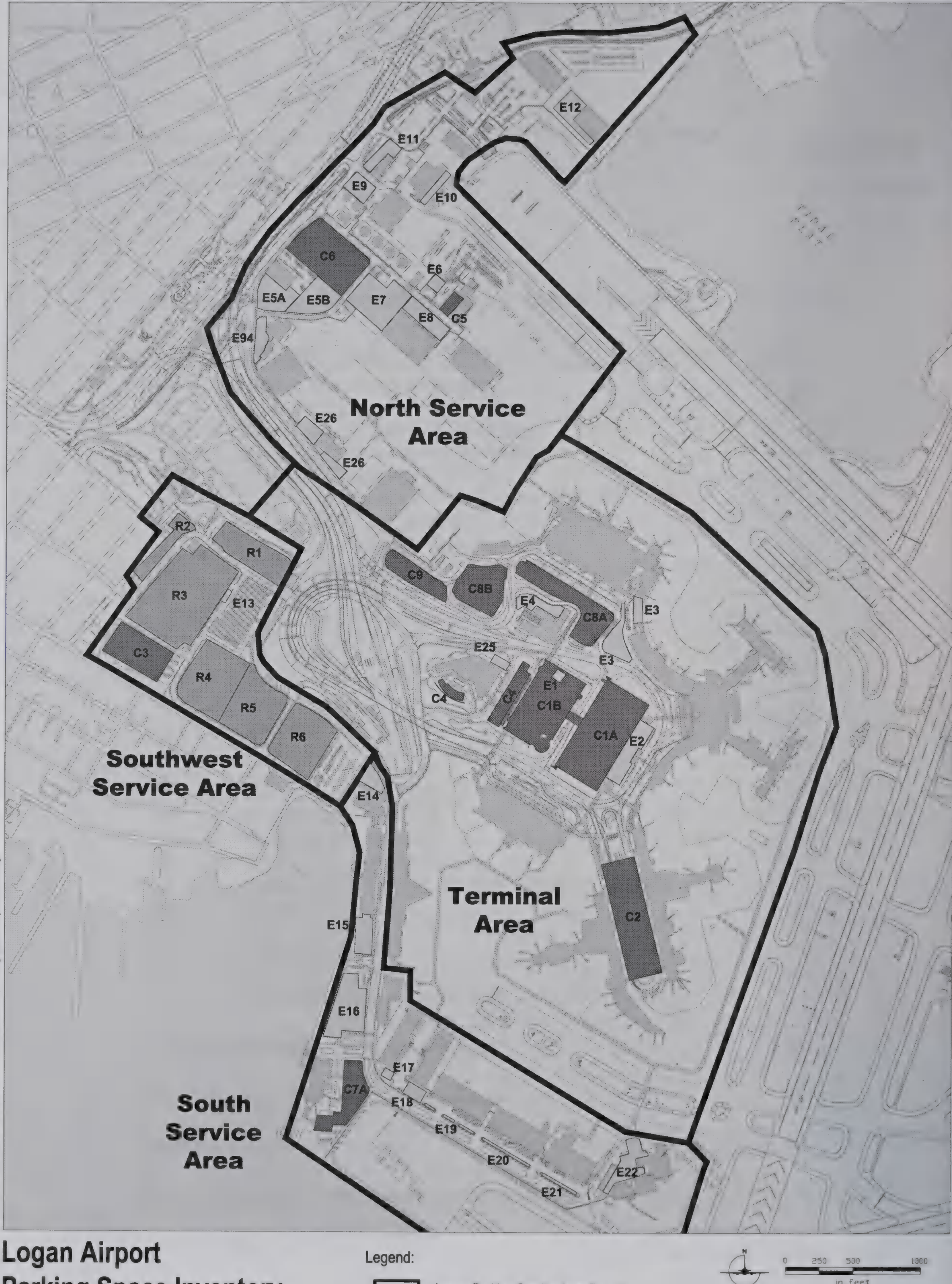
Map ID#	Location of Employee Parking Areas	Number of Spaces
E1	Central Parking / West Garage	83
E2	Massport Tower	526
E3	Old Terminal D (former State Police)	151
E4	Massport Facilities 1 (Heating Plant)	94
E5a	North Cargo Building 11, TSA lot	81
E5b	North Cargo Building 11, State Police lot	158
E6	North Gate & EMS Trailer	31
E7	North Cargo Building 7 (demolished)	-
E8	North Cargo Building 8	87
E9	US Airways Administration	72
E10	Massport Facilities 2	35
E11	Massport Facilities 3	87
E12	LSG Sky Chefs	112
E13	Massport Taxi Pool	10
E14	Gate Gourmet	85
E15	Bird Island Flats (BIF) / LOC Garage	504
E16	Lot B	297
E17	South Cargo Building 63	16
E18	South Cargo Building 62	51
E19	South Cargo Building 58	23
E20	South Cargo Building 57	44
E21	South Cargo Building 56	72
E22	Amelia Earhart Building (old RJ/GA Terminal)	89
E25	Hilton Hotel	30
E26	UPS	44
E94	Building 94 (United)	66
N/A	*ARFF Satellite Station* [1]	5

[1] This facility is located on the airfield and is not shown in the map.

Total In-Service Employee Parking Spaces	**2,853**
Total Designated Employee Parking Spaces	**520**
Total Employee Parking Spaces	**3,373**
Total Commercial Parking Spaces *(see table on previous page)*	**17,319**
TOTAL PARKING FREEZE SPACES	**20,692**

Rental Car Company Parking Spaces

Map ID#	Number of Spaces
R1	1,027
R2	130
R3	1,016
R4	1,550
R5	960
R6	337
Total Rental Car Spaces	**5,020**



Logan Airport Parking Space Inventory

Logan International Airport
East Boston, MA

Massachusetts Port Authority
September 1, 2009

Legend:

- Logan Parking Service Area Zones
- Commercial Parking Space Locations
- Employee Parking Space Locations
- Rental Car Parking Space Locations

Notes:

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H

Noise Abatement

This appendix provides detailed information, tables, and figures in support of *Chapter 6, Noise Abatement*:

Logan Airport RealContours™ Data Inputs

For this *2009 EDR*, Massport has produced a set of noise contours, time above (TA) noise metrics, and population counts for 2009 using the pair of software packages RealProfiles™ and RealContours™. This software incorporates the latest version of the Federal Aviation Administration (FAA) Integrated Noise Model (INM) Version 7.0b as the computational "engine" for calculating noise, but uses individual flight tracks taken directly from the new Massport radar system rather than relying on consolidated data summaries. For 2009, the radar systems retained suitable data for 332,027 flights; all of these were used in the noise model directly.

Introduction

Standard INM methodology involves development of operational inputs and calculation of the Day-Night Sound Level (DNL) for a prototypical average annual day. This approach requires manually collecting, refining, and entering the enormous amount of data related to a full year of activity at an airport. For example, the model inputs may include an aircraft fleet mix with several dozen representative aircraft types, numerous representative flight tracks (on the order of 100 to 300 is common for an airport comparable to Logan Airport), and runway use and flight track use percentages for three or four categories of aircraft types with similar performance characteristics.

This approach meets accepted professional standards, and reduces the effort and cost that would be associated with manually entering the parameters for every actual operation. However, it represents a significant simplification of the extraordinary diversity of actual aircraft operations over a year. It also does not take full advantage of the investment that Massport has made in installing and maintaining a state-of-the-art radar system[1], which automatically collects flight track data and flight identification data for all operations at the Airport and feeds the new Noise and Operations Monitoring System (NOMS).

For this report, Massport has selected an INM pre-processor, named RealContours™, which takes maximum possible advantage of both the INM's capabilities and the investment that the Massport has made in operations monitoring. RealContours™ automates the process of preparing the INM inputs directly from the actual flight operations, and permits airports to model the full diversity of activity as precisely as possible, at a cost equivalent to the more simplified manual approach. RealContours™ improves the precision of modeling by utilizing operations monitoring results in five key areas:

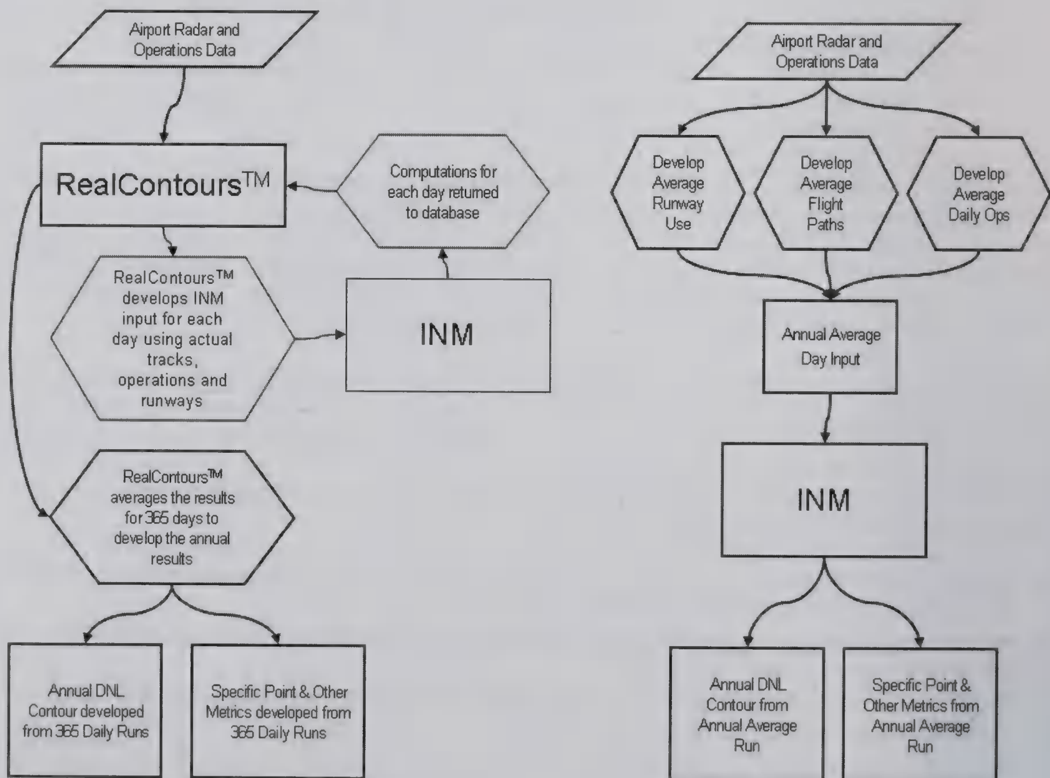
- Directly converts the flight track for every identified aircraft operation to an INM track, rather than assigning all operations to a limited number of prototypical tracks.
- Models each operation on the specific runway that it actually used, rather than applying a generalized distribution to broad ranges of aircraft types.
- Models each operation in the modeling time frame that it occurred which takes in account delays at the airport during the year.
- Selects the specific airframe and engine combination to model, on an operation-by-operation basis, based on the published composition of the fleets of the specific airlines operating at Logan Airport.
- Uses each aircraft's actual performance and altitude profile to develop inputs to the model which define the actual arrival or departure profile.

1 For 2009, the Massport system utilizes the Airscene product of Era Corporation.

As defined in the INM 7.0 User's Guide, the annual day-night average sound level (YDNL) is used for quantifying airport noise. The YDNL is the 365-day average, day-night average sound level. To use this definition to model noise in INM, one would have to run 365 cases of the model and average the results. Since this is time consuming and impractical, the current practice is to average the 365 days of data before the run and design one input file.[2] However, RealContours™ accomplishes this task by using the actual radar data to develop INM input files for each day of the year and then averaging the results to obtain the annual contour.

Figure H-1 provides a schematic representation of the RealContours™ noise modeling process compared to the standard INM process.

Figure H-1 Schematic Noise Modeling Process (Standard INM vs. RealContours™)



2 Federal Aviation Administration Integrated Noise Model (INM) Version 7.0 User's Guide, April 2007, p. 12.

2009 Radar Data

Logan Airport's radar data provide the key to the RealContours™ system. Since February 2004, Massport has collected PASSUR radar data which supplies information to the Airport's web-based Airport Monitor software. This dataset has been used for the *2004 ESPR* through the *2008 EDR*. For the *2009 EDR,* Massport is utilizing a new radar data source which feeds it new NOMS system. This radar data is called multilateration radar since it collects data from multiple ground stations (Massport has eight sensors) deployed around the airport. The positioning data from all of these sensors is correlated to provide better coverage in areas where the traditional FAA radar has limitations and provides a more complete set of points to define each track. Traditional radar provides points every four to five seconds where the multilateration provides data every second. The new system was able to collect 365 complete days of data for 2009 with approximately 97 percent of these tracks usable for the development of the noise exposure contours.

Fleet Mix

The 2009 radar data first were processed to establish a baseline set of operations. After processing 365 days of radar data, 332,027 flight tracks with sufficient data were identified to use as the baseline for the 2009 contour. The operations from these tracks were then scaled upwards by airline and aircraft type to match the reported totals for 2009 Table H-1 provides the scaled annual operations, as modeled, by aircraft type. The INM aircraft types modeled by RealContours™ match the types listed in Table H-1.

Runway Use

RealContours™ obtains its runway use information directly from the radar data based on the actual runways which were used each day throughout the modeled year. The runway use presented here is broken into six representative aircraft groups listed below: (see Table H-2).

- Heavy Jet A – B747s, A340s, DC-8s
- Heavy Jet B – B767s, B777s, A300s, A310s, A330s, DC-10s, L1011s, MD-11s
- Light Jet A – B717s, B727s, DC-9s, F100s, MD-90s
- Light Jet B – B737s, B757s, A319s, A320s, B-146s, MD-80s
- Regional Jet – E135, E145, E170, E190, CRJ2, CRJ7, CRJ9, J328 and Corporate Jets
- Turboprops and Piston Aircraft (Non-Jets)

The runway use has been grouped in this format to allow comparison with prior years.

Table H-2 shows the runway use that was used to model the 2009 noise conditions. As described above, turbojet aircraft in the table were grouped into different categories for reporting purposes. Because the 2009 contour developed using RealContours™ reflects the individual use of the runways by each INM aircraft type, it accurately represents Logan Airport's noisiest aircraft by modeling them on the actual runways that they used during the year. The modeled runway use for each particular aircraft type may be different than the overall group runway use presented in Table H-2.

Table H-1 2009 Annual Modeled Operations

INM Type	Runway Use Group	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Total
Commercial Jet Operations						
74720B	HJA	1	0	1	0	2
747400	HJA	1134	4	1093	45	2276
A340-211	HJA	1000	12	777	236	2025
A340-642	HJA	274	0	265	8	548
DC86HK **	HJA	0	1	1	0	2
DC870	HJA	146	41	12	174	374
767300	HJB	1270	129	1219	179	2797
767CF6	HJB	53	96	24	124	297
767JT9	HJB	2	11	0	13	27
777200	HJB	572	67	625	14	1279
777300	HJB	2	0	2	0	4
A300-622R	HJB	249	673	390	532	1844
A300B4-203	HJB	29	47	1	74	151
A310-304	HJB	167	27	7	187	389
A330-301	HJB	1312	3	1241	75	2631
A330-343	HJB	218	1	158	60	437
DC1010	HJB	399	268	232	435	1334
DC1030	HJB	171	133	94	209	607
MD11GE	HJB	0	1	0	1	2
717200	LJA	5065	713	5155	622	11554
727EM1	LJA	2	0	0	2	3
727EM2	LJA	181	173	224	130	708
DC93LW	LJA	86	8	81	16	191
DC95HW	LJA	704	123	654	174	1656
MD9025	LJA	101	0	100	1	203
737300	LJB	469	70	450	88	1077
7373B2	LJB	414	104	458	62	1038
737400	LJB	1193	12	1128	77	2409
737500	LJB	1945	117	1821	240	4123
737700	LJB	3310	807	3339	778	8235
737800	LJB	5102	1224	5534	793	12654
737N17	LJB	14	1	13	1	29
737N9	LJB	9	0	8	1	18
757300	LJB	14	37	49	2	103
757PW	LJB	6636	2505	7593	1547	18281
757RR	LJB	4917	1451	5780	588	12736
A319-131	LJB	13796	2398	14283	1911	32387
A320-211	LJB	1923	692	2326	289	5229
A320-232	LJB	10644	3800	12711	1733	28887

Note: Some totals may not match due to rounding.

Table H-1 2009 Annual Modeled Operations (Continued)

INM Type	Runway Use Group	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Total
Commercial Jet Operations (Continued)						
A321-232	LJB	122	123	101	144	490
MD82	LJB	1948	364	2162	149	4623
MD83	LJB	9098	1259	9559	798	20714
CL600	RJ	41	2	41	2	87
CL601	RJ	14174	584	14119	639	29516
CNA55B	RJ	2	0	2	0	4
CRJ9-ER	RJ	1718	275	1609	384	3986
CRJ9-LR	RJ	6	0	6	0	13
EMB145	RJ	10805	720	10427	1098	23050
EMB14L	RJ	1884	20	1772	132	3808
EMB17D**	RJ	5301	946	5281	966	12494
EMB19D**	RJ	10602	1281	11335	541	23758
FAL20	RJ	0	1	0	1	2
FAL900**	RJ	6	0	4	2	11
GIV	RJ	3	1	4	0	8
GV	RJ	1	0	0	1	2
LEAR35	RJ	54	6	56	5	121
Total		119289	21331	124330	16284	281233
Commercial Non-Jet Operations						
1900D	NJ	35	0	35	0	70
BEC58P	NJ	17898	613	18120	391	37023
C130	NJ	1	0	1	0	2
CNA208	NJ	9	0	6	0	14
CNA441	NJ	0	0	1	0	1
DC3	NJ	0	0	1	0	1
DHC6	NJ	5	0	5	0	10
DHC8	NJ	1787	20	1797	11	3615
DHC830	NJ	764	204	787	181	1936
PA31	NJ	166	267	124	309	865
SF340	NJ	4137	8	4119	26	8290
Total		24802	1113	24995	918	51828
Commercial Subtotal		144090	22444	149325	17202	333061
General Aviation (GA) Operations						
747400	HJA	2	0	2	0	4
A340-211	HJA	2	0	2	0	5
A340-642	HJA	3	0	0	0	3
767CF6	HJB	0	1	0	1	1
777200	HJB	3	0	3	0	7
A310-304	HJB	1	0	1	0	1
A330-301	HJB	5	1	5	1	12

Notes: BEC58P is the INM substitution for the Cessna 402.
Some totals may not match due to rounding.

Table H-1 2009 Annual Modeled Operations (Continued)						
	Runway	Arrivals		Departures		
INM Type	Use Group	Day	Night	Day	Night	Total
General Aviation Operations (Continued)						
A330-343	HJB	3	0	3	0	7
717200	LJA	1	0	2	0	2
727EM1	LJA	1	1	1	0	2
727EM2	LJA	1	1	1	1	2
DC93LW	LJA	0	1	1	0	1
F10062	LJA	5	1	6	0	13
7373B2	LJB	1	0	0	0	1
737400	LJB	3	1	3	1	8
737700	LJB	15	3	16	3	37
737800	LJB	5	3	6	1	14
737N17	LJB	0	1	0	0	1
757PW	LJB	6	0	7	0	14
757RR	LJB	4	1	4	1	9
A319-131	LJB	16	0	14	0	30
A320-211	LJB	5	2	8	0	15
A320-232	LJB	2	0	4	0	6
A321-232	LJB	1	0	0	0	2
MD81	LJB	1	0	1	0	2
MD83	LJB	1	0	0	0	1
CIT3	RJ	45	3	44	3	96
CL600	RJ	384	41	395	28	848
CL601	RJ	319	32	327	28	706
CNA500	RJ	129	11	136	5	281
CNA510	RJ	11	0	10	0	21
CNA55B	RJ	435	32	429	39	936
CNA750	RJ	251	42	271	22	586
CRJ9-ER	RJ	4	2	5	1	11
ECLIPSE500	RJ	4	0	4	0	9
EMB145	RJ	25	6	26	5	61
EMB14L	RJ	0	0	1	0	1
EMB17D**	RJ	6	2	5	3	16
EMB19D**	RJ	3	0	0	0	3
FAL20	RJ	1	0	0	0	2
FAL50**	RJ	96	8	96	7	206
FAL900**	RJ	97	7	97	8	209
GII	RJ	3	1	3	1	8
GIIB	RJ	30	8	33	5	77
GIV	RJ	266	26	259	33	584
GV	RJ	191	26	193	24	433

Note: Some totals may not match due to rounding.

Table H-1 2009 Annual Modeled Operations (Continued)						
	Runway	Arrivals		Departures		
INM Type	Use Group	Day	Night	Day	Night	Total
General Aviation Operations (Continued)						
IA1125	RJ	35	1	34	2	72
LEAR25	RJ	6	1	6	1	14
LEAR35	RJ	955	109	970	93	2127
MU3001	RJ	657	81	656	82	1477
1900D	NJ	315	35	320	30	699
A109	NJ	2	0	1	0	3
B206L	NJ	8	0	7	1	15
B212	NJ	0	0	1	0	1
B222	NJ	0	1	1	0	1
B407	NJ	2	0	1	0	3
BEC58P	NJ	235	39	246	29	550
BO105	NJ	3	0	2	1	6
CNA172	NJ	7	0	7	0	15
CNA206	NJ	84	3	86	1	174
CNA208	NJ	236	15	242	8	501
CNA20T	NJ	9	1	9	1	20
CNA441	NJ	82	10	80	11	183
DHC6	NJ	215	26	221	20	482
DHC8	NJ	1	1	1	0	3
DHC830	NJ	2	1	2	1	7
DO328	NJ	1	0	0	1	2
EC130	NJ	0	0	1	0	2
EMB120	NJ	0	0	1	0	1
GASEPF	NJ	18	0	18	1	37
GASEPV	NJ	169	10	170	9	359
HS748A	NJ	4	0	4	0	8
J328	NJ	1	1	1	0	2
PA28	NJ	9	0	8	0	18
PA30	NJ	1	0	1	0	3
PA31	NJ	50	4	47	7	108
PA42	NJ	1	1	2	1	5
R22	NJ	0	1	0	1	1
R44	NJ	1	0	1	0	1
S70	NJ	1	0	0	0	1
S76	NJ	15	1	15	1	32
SA330J	NJ	0	1	1	0	1

Note: Some totals may not match due to rounding.

Table H-1 2009 Annual Modeled Operations (Continued)						
	Runway	Arrivals		Departures		
INM Type	Use Group	Day	Night	Day	Night	Total
General Aviation Operations (Continued)						
SA341G	NJ	1	0	0	0	1
SA350D	NJ	2	0	2	0	4
SD330	NJ	4	0	4	1	9
SF340	NJ	3	0	3	0	6
Total		5522	604	5594	522	12242
Grand Total		149612	23047	154919	17724	345303

Source: HMMH, 2009.
Notes: Annual operations modeled in the 2009 Annual contour.
** User Defined Aircraft.
Some totals may not match due to rounding.
HJA, HJB Heavy Jets A and B
LJA, LJB Light Jets A and B
RJ Regional Jets
NJ Non-jets

Table H-2 2009 Modeled Runway Use by Aircraft Group

ARRIVALS

	Heavy Jets - Group A		Heavy Jets - Group B		Light Jets - Group A		Light Jets - Group B		Regional Jets		Turboprops (Non-jets)	
Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
4L	0.53%	0.00%	0.59%	0.14%	4.33%	0.83%	4.44%	0.74%	12.88%	3.58%	24.96%	11.77%
4R	41.58%	35.73%	38.23%	30.08%	35.60%	30.71%	34.69%	27.34%	26.42%	28.13%	13.97%	17.31%
9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15L	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15R	3.86%	1.75%	3.41%	1.41%	2.64%	2.86%	2.64%	2.46%	2.64%	2.44%	2.59%	2.19%
22L	23.12%	26.90%	13.94%	25.32%	9.36%	24.49%	14.02%	25.80%	17.80%	23.50%	18.17%	28.46%
22R	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.34%	2.14%
27	19.97%	7.23%	34.08%	10.20%	34.08%	16.07%	35.78%	13.77%	28.42%	17.14%	18.77%	11.31%
32	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	3.81%	0.05%	11.88%	0.49%
33L	10.95%	28.40%	9.75%	32.86%	9.75%	25.03%	8.41%	29.89%	8.03%	25.16%	6.53%	26.35%
33R	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.78%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

DEPARTURES

	Heavy Jets - Group A		Heavy Jets - Group B		Light Jets - Group A		Light Jets - Group B		Regional Jets		Turboprops (Non-jets)	
Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
4L	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	17.28%	14.04%
4R	21.38%	10.11%	14.57%	6.00%	6.12%	5.64%	8.16%	6.74%	3.91%	3.24%	5.14%	4.64%
9	9.70%	5.06%	20.40%	14.05%	36.32%	28.24%	31.70%	26.84%	37.02%	31.83%	11.00%	7.91%
14	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.14%	0.00%
15L	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15R	13.56%	38.66%	5.57%	25.26%	1.51%	11.65%	2.29%	9.21%	1.08%	9.22%	6.05%	16.06%
22L	12.05%	5.06%	6.26%	2.00%	3.21%	2.59%	1.99%	1.52%	0.78%	0.46%	0.94%	1.60%
22R	24.91%	16.10%	30.80%	28.80%	32.99%	27.32%	34.04%	30.31%	36.22%	32.07%	42.75%	31.36%
27	0.61%	4.13%	3.72%	5.81%	5.02%	8.66%	5.60%	10.38%	3.22%	3.69%	3.22%	3.69%
32	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33L	17.79%	20.88%	18.68%	18.03%	14.82%	15.91%	16.21%	15.02%	14.95%	11.81%	13.42%	20.55%
33R	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.16%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Massport, HMMH.
Notes: Night for noise modeling is defined as 10 pm to 7am.
Nighttime runway restrictions are from 11pm to 6 am.

Comparing Table H-2 above with the similar Table H-2 in the *2008 EDR*, departure use of Runway 33L decreased for all jet groups for day and night except for Heavy Jets - Group A at night which saw a 3.7 percent increase. Non-Jet use increased over 2008 during both the day and night. For departures, the largest increase for Heavy Jet - Group A was on Runway 22L during the day (11.7 percent) and at night (5.1 percent) with large decreases on Runway 22R for both day and night. For Heavy Jet - Group B, the largest increase was on Runway 22L during the day (6.2 percent) and Runway 15R at night (5.2 percent) with decreases on Runway 22R. For Light Jets - Group A, the largest increase is on Runway 4R during the day and night with decreases on Runway 22R compared to 2008. For Light Jets - Group B, the largest increase was on Runway 22L during the day and at night the increases were spread out among several runways (Runway 9, 15R 4R, 22L and 27) with the decrease mainly from Runway 22R. For Regional Jets there was an increase on Runways 4R for both day and night and Runway 9 at night. Regional Jet use on Runway 27 declined between 2008 and 2009 for both day and night.

While Table H-2 presents runway use by aircraft groups, Table H-3 presents the total runway use by runway and time of day. The first section of the table displays the operations by runway and time of day for an average day. The second section displays the same information for the year and the last section displays the percent that each runway is used by operation type and time of day. Table H-3 shows that on an average day Runway 22R has the most departures (152.7 per day) and Runway 27 has the most arrivals (124.1 per day). At night, Runway 22R has the most departures (14.6 per day) but Runway 33L has the most arrivals (18.2 per day).

Table H-3 Summary of Jet and Non-Jet Aircraft Runway Use

	Runway												
	4L	4R	9	14[2]	15L	15R	22L	22R	27	32	33L	33R	Total
2009 Daily Operations													
Departures Day	12.5	27.8	125.1	0.1	0.0	11.6	7.3	152.7	22.0	--	65.2	<0.1	424.4
Departures Night	0.4	2.8	12.2	<0.1	0.0	5.9	0.7	14.6	4.6	--	7.3	<0.1	48.6
Arrivals Day	43.5	117.2	--	--	<0.1	10.9	65.3	1.7	124.1	13.7	33.0	0.6	409.9
Arrivals Night	1.2	17.2	--	--	0.0	1.5	16.1	<0.1	8.9	<0.1	18.2	0.0	63.1
Total Daily Operations	57.6	165.0	137.2	0.1	0.0	30.0	89.3	169.1	159.6	13.7	123.7	0.6	946.0
2009 Annual Operations													
Departures Day	4,577	10,147	45,651	42	0	4,245	2,653	55,735	8,043	--	23,807	20	154,919
Departures Night	146	1,016	4,440	1	0	2,163	259	5,340	1,679	--	2,679	1	17,724
Arrivals Day	15,892	42,782	--	--	1	3,980	23,828	617	45,281	4,992	12,034	205	149,612
Arrivals Night	420	6,288	--	--	0	548	5,862	25	3,253	7	6,643	0	23,047
Total Annual Operations	21,036	60,233	50,090	43	1	10,936	32,601	61,717	58,255	5,000	45,163	227	345,303
2009 Operations Percentage													
Percentage Departures Day	3%	7%	29%	< 1%	0%	3%	2%	36%	5%	--	15%	< 1%	100%
Percentage Departures Night	< 1%	6%	25%	< 1%	0%	12%	1%	30%	9%	--	15%	< 1%	100%
Percentage Arrivals Day	11%	29%	--	--	< 1%	3%	16%	< 1%	30%	3%	8%	< 1%	100%
Percentage Arrivals Night	2%	27%	--	--	0%	2%	25%	< 1%	14%	< 1%	29%	0%	100%

Source: Massport Noise Office and HMMH 2010.

Notes: The data reflect actual percentages of aircraft operations on each runway end. They should not be confused with effective runway use which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Runway 14-32 is unidirectional
Values may not add to 100 percent due to rounding.

Overall, the Airport continued to favor a north-south operating flow in 2009 as shown with the percentage of jet departures by operating direction in Figure 6-5 of *Chapter 6, Noise Abatement.*

Flight Tracks

RealContours™ converts each radar track to an INM model track and then models the scaled aircraft operation on that track. This method keeps the lateral and vertical dispersion of the aircraft types consistent with the radar data, and ensures that anomalies in the departure paths are captured in the RealContours™ system. Table H-4 lists the number of flight tracks used in the RealContours™ modeling system for 2009. Flight tracks from October of 2009 are displayed in Figures 6-7 through 6-12 in Chapter 6.

Table H-4 Total Count of Flight Tracks Modeled in RealContours™ (2009)

	Runway											
	4L	4R	9	14	15L	15R	22L	22R	27	32	33L	33R
Departures	4,278	10,770	49,298	36	0	6,038	2,799	58,929	9,445	0	25,765	18
Arrivals	15,331	47,096	0	0	1	4,336	28,213	572	46,534	4,564	17,846	158

Source: HMMH 2010, ERA NOMS data

Flight Profiles

To further enhance the results from RealContours™, Massport elected to use the companion RealProfiles™ software. By using the actual radar information along with the equations developed for the INM, RealProfiles™ develops an altitude profile for each aircraft operation. This profile is then modeled in the RealContours™ system. As a result, the modeled aircraft follows both the actual radar track on the ground and the actual radar altitude profile in the sky.

RealProfiles™ provides several advantages over the standard INM profile modeling. The standard INM modeling uses a "Stagelength" to identify an aircraft's departure weight and then models a standard departure profile for that Stagelength. Using Realprofiles™, the RealContours™ system selects a weight similar to the standard modeling but then develops a profile to allow the INM aircraft to follow the actual path flown for that route. For example, if aircraft departing from a particular runway are required to remain level at 3,000 feet for a certain distance, RealProfiles™ will develop a profile that remains level for that distance along the track. In contrast, the standard modeling would use the standard INM profile and would not model the level segment.

RealProfiles™ was able to compute profiles based on the actual radar data for 97.5 percent of the available departure tracks and 87.3 percent of the available arrivals. RealProfiles™ uses the INM supplied aircraft performance database to develop its unique profiles; however for several aircraft in the INM database the aircraft performance data is not available. For those profiles the INM database contains fixed profiles which are not modified and are used as supplied with the INM data.

Residential Sound Insulation Program

In 2009, Massport completed sound insulation of 111 residential buildings containing 287 dwelling units, resulting in a total of 5,256 residential buildings and 11,136 dwelling units that have been sound insulated since 1986 when the program was first implemented. Table H-5 lists the yearly progress of this mitigation effort.

Table H-5 Residential Sound Insulation Program Status (1986-2009)

Construction Year	Residential Buildings[1]	Dwelling Units[2]
1986	4	8
1987	43	51
1988	102	159
1989	94	133
1990	121	200
1991	175	360
1992	197	354
1993	318	654
1994	310	542
1995	372	753
1996	323	577
1997	364	808
1998	328	806
1999	330	718
2000	195	601
2001	260	278
2002	205	354
2003	230	468
2004	320	791
2005	314	471
2006	286	827
2007	160	548
2008	94	388
2009	111	287
Total	5,256	11,136

Source: Massport, 2010.
1 Includes multiple units.
2 Individual units.

Following the FAA's approval of model adjustments based on the effects of terrain (discussed in the *1999 ESPR*), Massport submitted, and the New England Region of the FAA approved, a new sound insulation program. The revised contour, approved for a two-year period beginning in 1999, included dwelling units in East Boston, South Boston, and Winthrop that previously had not been eligible for insulation. Massport received notice of FAA funding in the amount of $5 million. Subsequently, Massport updated its program contour, first with the *2001 EDR* contour and more recently with the Logan Airside Improvements Project approved contour. These updates have allowed Massport to continue the program with additional funds every year since 1999. This latest update takes into account runway use changes due to the new Runway 14-32 which opened in late November 2006. This update expands the focus of the sound insulation program into Chelsea. Table H-6 provides a list of all schools that have been treated under Massport's sound insulation program. To date, Massport has provided sound insulation to 36 schools at a cost of over $8 million.

Table H-6 Schools Treated Under Massport Sound Insulation Program

Boston:		
East Boston		
East Boston High		$381,948
St. Mary's Star of the Sea		$80,901
St. Dominic Savio High		$127,879
St. Lazurus		$46,092
James Otis		$46,092
Samuel Adams		$120,650
Curtis Guild		$180,572
Dante Alighieri		$97,750
P.J. Kennedy		$127,637
Donald McKay		$231,754
Hugh Roe O'Donnell		$113,564
E Boston Central Catholic		$391,768
Manassah Bradley		$237,500
13	East Boston Schools	$2,184,107
South Boston:		
St. Augustine		$92,855
Cardinal Cushing		$47,276
Patrick Gavin		$217,077
St. Bridgid's		$112,100
Oliver Hazard Perry		$337,538
Condon School		$294,481
6	South Boston Schools	$1,101,327
Roxbury & Dorchester:		
Samuel Mason		$192,401
Dearborn Middle		$248,238
Ralph Waldo Emerson		$155,851
Lewis Middle		$202,092
Nathan Hale Elem.		$92,302
Phillis Wheatley Elem.		$290,794
Davis Ellis Elem.		$253,663
Henry L. Higginson		$119,543
8	Roxbury & Dorchester Schools	$1,554,884
27	Total Boston Schools	$4,840,318
Winthrop		
Winthrop Jr. High School		$63,756
E. B. Newton		$184,674
A. T. Cummings (Ctr.) School		$800,000
3	Total Winthrop Schools	$1,048,430
Revere		
Beachmont School		$854,864
1	Total Revere School	$854,864
Chelsea		
Shurtleff School		$292,207
Williams School		$486,258
St. Rose Elementary		$46,396
St. Stanislaus		$66,298
Chelsea High School		$524,249
5	Total Chelsea Schools	$1,415,408
36	Total Schools	$8,159,020

Source: Massport, 2010

Noise Exposed Population

Table H-7 presents the noise exposed population by community for 2009. This table includes population within the 60-65 dB DNL contours, although a DNL of 65 dB is the federally-defined noise criterion used as a guideline to identify when residential land use is considered incompatible with aircraft noise. The 2008 results using both INMv7.0a and INMv70b, and the 2009 results using INMv7.0b, are presented in the table.

Table H-7 Noise-Exposed Population by Community

Year	Census Data	80+ dB DNL	75-80 dB DNL	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
BOSTON[2]							
1990	1980	0	0	1,778	28,970	30,748	NA
1992	1980	0	0	800	4,316	5,116	NA
1993	1980	0	0	264	2,820	3,084	NA
1994	1990	0	106	265	7,698	8,069	30,895
1995	1990	0	106	851	8,815	9,772	33,765
1996	1990	0	106	374	8,775	9,255	40,992
1997	1990	0	106	719	13,857	14,682	54,804
1998	1990	0	58	580	10,877	11,515	52,201
1999[3]	1990	0	58	364	11,632	12,054	45,948
2000[3]	1990	0	58	183	7,880	8,121	32,474
2000[3]	2000	0	0	234	9,014	9,248	35,785
2001[3]	2000	0	0	315	6,515	6,700	27,778
2002[3]	2000	0	0	132	2,625	2,757	23,225
2003[3]	2000	0	0	164	1,730	1,894	21,763
2004[3,4]	2000	0	65	192	4,142	4,399	24,473
2005[3,4]	2000	0	65	104	2,020	2,189	17,661
2006[4]	2000	0	65	99	1,054	1,218	14,866
2007 (INMv7.0a)[4]	2000	0	0	169	4,094	4,263	21,446
2008 (INMv7.0a)[4]	2000	0	0	0	2,376	2,381	16,663
2008 (INMv7.0b)[4]	2000	0	5	0	3,487	3,492	18,890
2009 (INMv7.0b)[4]	2000	0	5	67	937	1,009	12,284
CHELSEA							
1990	1980	0	0	0	4,813	4,813	NA
1992	1980	0	0	0	3,952	3,952	NA
1993	1980	0	0	0	0	0	NA
1994	1990	0	0	0	0	0	8,510
1995	1990	0	0	0	95	95	9,750
1996	1990	0	0	0	0	0	8,744
1997	1990	0	0	0	0	0	10,001
1998	1990	0	0	0	0	0	9,222
1999	1990	0	0	0	95	95	9,249
2000	1990	0	0	0	0	0	5,622
2000	2000	0	0	0	0	0	7,361
2001	2000	0	0	0	0	0	4,508
2002	2000	0	0	0	0	0	3,995
2003	2000	0	0	0	0	0	3,591
2004[4]	2000	0	0	0	0	0	7,756
2005[4]	2000	0	0	0	0	0	5,772
2006[4]	2000	0	0	0	0	0	2,477
2007 (INMv7.0a)[4]	2000	0	0	0	0	0	9,774
2008 (INMv7.0a)[4]	2000	0	0	0	0	0	6,462
2008 (INMv7.0b)[4]	2000	0	0	0	0	0	7,793
2009 (INMv7.0b)[4]	2000	0	0	0	0	0	5,462

Table H-7 Noise-Exposed Population by Community (Continued)							
Year	Census Data	80+ dB DNL	75-80 dB DNL	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
EVERETT							
1990	1980	0	0	0	0	0	NA
1992	1980	0	0	0	0	0	NA
1993	1980	0	0	0	0	0	NA
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999[3]	1990	0	0	0	0	0	0
2000[3]	1990	0	0	0	0	0	0
2000[3]	2000	0	0	0	0	0	0
2001[3]	2000	0	0	0	0	0	0
2002[3]	2000	0	0	0	0	0	0
2003[3]	2000	0	0	0	0	0	0
2004[3,4]	2000	0	0	0	0	0	0
2005[3,4]	2000	0	0	0	0	0	0
2006[4]	2000	0	0	0	0	0	0
2007 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0b)[4]	2000	0	0	0	0	0	0
2009 (INMv7.0b)[4]	2000	0	0	0	0	0	0
MEDFORD							
1990	1980	0	0	0	0	0	NA
1992	1980	0	0	0	0	0	NA
1993	1980	0	0	0	0	0	NA
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999	1990	0	0	0	0	0	0
2000	1990	0	0	0	0	0	0
2000	2000	0	0	0	0	0	0
2001	2000	0	0	0	0	0	0
2002	2000	0	0	0	0	0	0
2003	2000	0	0	0	0	0	0
2004[4]	2000	0	0	0	0	0	0
2005[4]	2000	0	0	0	0	0	0
2006[4]	2000	0	0	0	0	0	0
2007 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0b)[4]	2000	0	0	0	0	0	0
2009 (INMv7.0b)[4]	2000	0	0	0	0	0	0

Table H-7 Noise-Exposed Population by Community (Continued)							
Year	Census Data	80+ dB DNL	75-80 dB DNL	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
QUINCY							
1990	1980	0	0	0	0	0	NA
1992	1980	0	0	0	0	0	NA
1993	1980	0	0	0	0	0	NA
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999	1990	0	0	0	0	0	0
2000	1990	0	0	0	0	0	0
2000	2000	0	0	0	0	0	636
2001	2000	0	0	0	0	0	610
2002	2000	0	0	0	0	0	610
2003	2000	0	0	0	0	0	610
2004[4]	2000	0	0	0	0	0	610
2005[4]	2000	0	0	0	0	0	610
2006[4]	2000	0	0	0	0	0	610
2007 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0a)[4]	2000	0	0	0	0	0	0
2008 (INMv7.0b)[4]	2000	0	0	0	0	0	0
2009 (INMv7.0b)[4]	2000	0	0	0	0	0	0
REVERE							
1990	1980	0	0	0	4,274	4,274	NA
1992	1980	0	0	0	3,848	3,848	NA
1993	1980	0	0	0	4,617	4,617	NA
1994	1990	0	0	0	3,569	3,569	2,099
1995	1990	0	0	0	3,364	3,364	2,304
1996	1990	0	0	172	3,292	3,464	2,505
1997	1990	0	0	0	3,293	3,293	2,047
1998	1990	0	0	0	3,168	3,168	2,132
1999	1990	0	0	128	3,165	3,293	2,047
2000	1990	0	0	0	2,552	2,552	2,386
2000	2000	0	0	0	2,496	2,496	3,100
2001	2000	0	0	0	2,496	2,496	3,100
2002	2000	0	0	0	2,822	2,822	2,399
2003	2000	0	0	0	2,994	2,994	2,227
2004[4]	2000	0	0	82	2,969	3,051	2,678
2005[4]	2000	0	0	82	2,540	2,622	2,731
2006[4]	2000	0	0	82	2,540	2,622	2,698
2007 (INMv7.0a)[4]	2000	0	0	0	2,450	2,450	2,853
2008 (INMv7.0a)[4]	2000	0	0	0	2,434	2,434	1,749
2008 (INMv7.0b)[4]	2000	0	0	0	2,434	2,434	1,802
2009 (INMv7.0b)[4]	2000	0	0	0	2,512	2,512	1,452

Table H-7 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB DNL	75-80 dB DNL	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
WINTHROP							
1990	1980	0	676	1,211	2,420	4,307	NA
1992	1980	0	626	1,146	2,488	4,262	NA
1993	1980	0	648	1,211	1,773	3,632	NA
1994	1990	0	417	1,343	5,154	6,914	7,512
1995	1990	0	482	1,611	5,757	7,850	7,077
1996	1990	0	417	1,376	5,930	7,723	7,333
1997	1990	0	417	1,659	6,386	8,462	6,839
1998	1990	0	519	1,522	6,572	8,613	6,507
1999	1990	0	353	1,408	5,946	7,707	7,135
2000	1990	0	277	991	5,240	6,508	7,296
2000	2000	0	247	1,070	4,684	6,001	7,776
2001	2000	0	244	683	4,123	5,050	8,104
2002	2000	0	2	481	2,247	2,730	7,921
2003	2000	0	0	339	1,956	2,295	7,386
2004[4]	2000	0	2	337	1,649	1,988	6,508
2005[4]	2000	0	39	347	1,280	1,666	6,353
2006[4]	2000	0	39	416	1,288	1,743	6,845
2007 (INMv7.0a)[4]	2000	0	0	247	1,139	1,386	6,749
2008 (INMv7.0a)[4]	2000	0	0	244	909	1,153	5,559
2008 (INMv7.0b)[4]	2000	0	0	244	1,409	1,653	6,547
2009 (INMv7.0b)[4]	2000	0	0	171	643	814	4,221
All Communities							
1990	1980	0	676	2,989	40,477	44,142	NA
1992	1980	0	628	2,352	14,604	17,584	NA
1993	1980	0	648	1,475	9,210	11,333	NA
1994	1990	0	523	1,608	16,421	18,552	49,016
1995	1990	0	588	2,462	18,031	21,081	52,896
1996	1990	0	523	1,922	17,997	20,442	59,574
1997	1990	0	523	2,378	23,536	26,437	73,691
1998	1990	0	577	2,102	20,617	23,296	70,062
1999	1990	0	411	1,900	20,838	23,149	64,379
2000	1990	0	335	1,174	15,672	17,181	47,778
2000	2000	0	247	1,304	16,194	17,745	54,190
2001	2000	0	244	998	13,004	14,246	43,616
2002	2000	0	2	613	7,694	8,309	38,150
2003	2000	0	0	503	6,680	7,183	35,577
2004[4]	2000	0	67	611	8,760	9,438	41,975
2005[4]	2000	0	104	533	5,840	6,477	33,127
2006[4]	2000	0	104	597	4,882	5,583	27,496
2007 (INMv7.0a)[4]	2000	0	0	416	7,683	8,099	40,822
2008 (INMv7.0a)[4]	2000	0	0	244	5,719	5,963	30,433
2008(INMv7.0b)[4]	2000	0	5	244	7,330	7,579	35,122
2009 (INMv7.0b)[4]	2000	0	5	238	4,092	4,335	23,419

Source: Data prepared for Massport by HMMH.
NA Not available.
1 65 dB DNL is the Federally-defined noise criterion.
2 Portions of Dorchester, East Boston, Roxbury, South Boston, and the South End are included in Boston totals.
3 Boston population by community changed in 1999 due to employment of more accurate hill effects methodology and reporting change.
4 All results since 2004 are from the RealContours™ modeling system.

Noise Complaints

Table H-8 presents a summary by community of the total complaints made in 2009 to which can be filed either by Massport's Noise Complaint Line or through a form on Massport's website. The Noise Complaint Line provides individuals the ability to express their concerns about aviation noise (activities) or to ask questions regarding noise at Logan Airport. Callers ask a range of questions such as "Why is this runway in use?"; "What times do the planes stop flying?" and "Was that aircraft off-course?"

The Noise Abatement Office (NAO) staff documents noise line complaints by obtaining information from the caller about the nature of the complaint, time of the occurrence, location of caller's residence, and the activity that was disturbed. The NAO uses the collected information to determine the probable activity responsible for the complaint and writes a letter report to the complainant. The letter includes the original complaint, a response that identifies the activity responsible for the call (arrivals, departures, run-up, etc.), meteorological information at the time of the call (a major factor in aviation activities), runways in use at the time of the call, and a notice that the FAA will receive a copy of the report.

In 2009, Massport received a total of 5,869 noise complaints from 51 communities, an increase of 28.1 percent from 2008, when the NAO received 4,580 complaints (Figure H-2). Nine communities with more than 100 annual complaints had an increase in the number of calls from 2008 and three communities with more than 100 annual complaints had a decrease in the number of calls from 2008. As shown in Figure H-3, there are more complaints per caller in 2009 than there have been since 2004. The most frequent complaint is "Aircraft off course," which was reported 34 percent of the time and "Aircraft too low," which was reported 31 percent of the time. Massport's website, www.massport.com, provides for additional general questions and answers regarding the Noise Complaint Line.

Figure H-2 Number of Callers and Complaints between 2004 and 2009

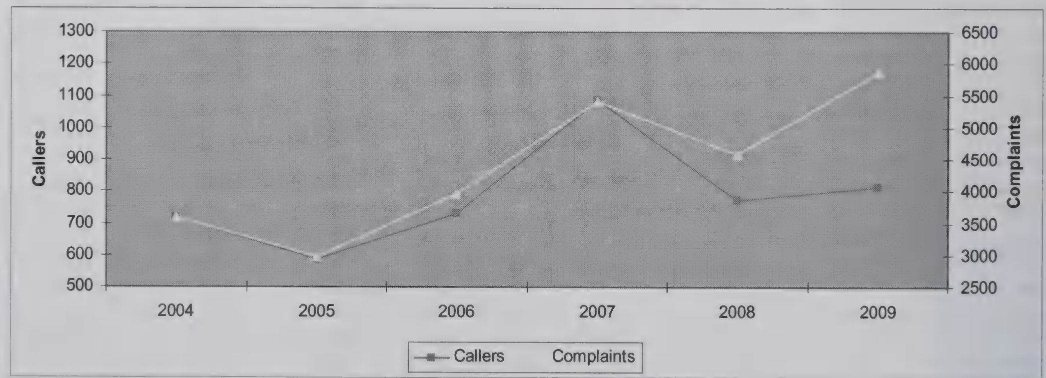


Table H-8 Noise Complaint Line Summary

	2008		2009		Change		2008		2009		Change
Town	Calls	Callers	Calls	Callers	Calls	Town	Calls	Callers	Calls	Callers	Calls
Arlington	19	7	13	12	(6)	Melrose	1	1	1	1	0
Ashland	1	1	0	0	(1)	Milton	74	17	54	22	(20)
Belmont	0	0	14	4	14	Nahant	100	37	400	111	300
Beverly	1	1	0	0	(1)	Natick	1	1	0	0	(1)
Billerica	1	1	0	0	(1)	Newton	0	0	1	1	1
Boston	28	18	67	18	39	Norton	0	0	1	1	1
Braintree	4	2	0	0	(4)	Norwell	29	1	15	1	(14)
Brant Rock	12	1	0	0	(12)	Peabody	1	1	5	3	4
Brockton	0	0	1	1	1	Quincy	21	13	34	10	13
Brookline	6	5	0	0	(6)	Reading	0	0	2	2	2
Cambridge	674	41	471	29	(203)	Revere	76	31	103	26	27
Canton	2	1	3	2	1	Roslindale	9	5	4	4	(5)
Charlestown	10	7	8	6	(2)	Roxbury	53	9	64	5	11
Chelmsford	1	1	0	0	(1)	Salem	2	1	3	1	1
Chelsea	414	43	570	32	156	Scituate	1	1	8	4	7
Cohasset	16	7	4	2	(12)	Sharon	23	1	0	0	(23)
Danvers	1	1	0	0	(1)	Somerville	430	114	325	87	(105)
Dedham	1	1	0	0	(1)	South Boston	24	17	26	15	2
Dorchester	11	7	6	4	(5)	South End	44	12	50	11	6
East Arlington	1	1	1	1	0	Stoneham	0	0	2	1	2
East Boston	575	71	1,657	55	1,082	Stoughton	9	1	13	3	4
Everett	65	13	121	26	56	Sudbury	2	2	0	0	(2)
Framingham	3	1	0	0	(3)	Swampscott	10	3	10	4	0
Hamilton	0	0	1	1	1	Wakefield	0	0	3	3	3
Hingham	26	6	47	6	21	Watertown	13	1	4	2	(9)
Hull	65	22	23	10	(42)	West Medford	1	1	1	1	0
Hyde Park	18	3	0	0	(18)	West Newton	8	1	26	1	18
Jamaica Plain	119	18	93	8	(26)	West Roxbury	2	2	0	0	(2)
Lexington	127	1	0	0	(127)	Weston	35	2	0	0	(35)
Lynn	150	6	154	7	4	Weymouth	222	2	184	4	(38)
Lynnfield	3	2	0	0	(3)	Whitman	1	1	0	0	(1)
Malden	10	4	17	8	7	Wilmington	1	1	0	0	(1)
Marblehead	7	5	1	1	(6)	Winchester	2	2	9	8	7
Marshfield	141	11	228	6	87	Winthrop	430	150	513	170	83
Medford	150	29	504	67	354	Woburn	288	3	3	3	(285)
Medway	5	1	0	0	(5)	Worcester	0	0	1	1	1
						Total	4,580	773	5,869	812	1,289

Source: Massport NAO.

Fleet Mix

As in the past, operations by aircraft types have been summarized into several key categories: commercial (passenger and cargo) operations, Stage 2 or Stage 3 jet aircraft, and turboprop and propeller (non-jet) aircraft. In addition, the operations are split into daytime and nighttime periods, where nighttime hours are defined as 10:00 PM to 7:00 AM, consistent with the definition of DNL. Table H-9 summarizes the numbers of operations by categories of aircraft operating at Logan Airport from 1990 through 2009. General aviation (GA) operations were not included in the noise modeling prior to 1998 and commercial jet operations were not separated until 1999.

Table H-9 Modeled Daily Operations by Commercial and General Aviation Aircraft[1] - 1990 to 2002

		1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Commercial Aircraft													
Stage 2 Jets[2]	Day	312.40	228.89	203.34	189.40	156.90	132.40	108.46	84.93	83.30	5.13	1.18	0.05
	Night	19.99	13.13	7.44	10.10	5.50	4.79	7.75	5.92	6.66	0.26	0.05	0.00
	Totals	332.39	242.02	210.78	199.50	162.40	137.19	116.21	90.85	89.96	5.39	1.23	0.05
Stage 3 Jets (All)	Day	288.89	384.49	418.99	425.70	429.40	439.81	505.08	541.43	597.28	727.09	756.24	740.75
	Night	57.25	58.29	65.47	62.80	69.00	80.16	85.06	95.54	98.59	103.66	109.77	97.04
	Totals	346.14	442.78	484.46	488.50	498.40	519.97	590.14	636.97	695.87	830.75	866.01	837.79
Conventional Jets	Day	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	569.18	648.95	569.99	500.70
	Night	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	96.21	99.79	101.30	83.52
	Totals	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	665.39	748.74	671.29	584.22
Regional Jets	Day	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	28.10	78.14	186.25	240.05
	Night	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	2.38	3.87	8.47	13.52
	Totals	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]	30.48	82.01	194.72	253.57
Non-Jet Aircraft	Day	444.41	411.84	598.16	541.97	526.85	505.31	514.70	552.56	448.82	409.62	317.62	165.45
	Night	11.72	69.32	46.84	13.59	11.14	13.73	27.27	21.86	16.63	21.58	10.97	3.45
	Total	456.13	481.16	645.00	555.56	537.99	519.04	541.97	574.42	465.45	431.20	328.58	168.89
Total Commercial Operations	Day	1045.70	1025.22	1220.49	1157.07	1113.15	1077.52	1128.24	1178.92	1129.90	1141.84	1075.04	906.25
	Night	88.96	140.74	119.75	86.49	85.64	98.68	120.08	123.32	121.88	125.51	120.79	100.49
	Total	1134.66	1165.96	1340.24	1243.56	1198.79	1176.20	1248.32	1302.24	1251.78	1267.35	1195.82	1006.73
GA Aircraft													
Stage 2 Jets[2]	Day	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	5.25	9.89	7.29	5.15	3.65
	Night	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	0.40	0.74	0.64	0.50	0.41
	Total	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	5.65	10.63	7.93	5.65	4.08
Stage 3 Jets	Day	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	30.54	48.46	40.08	34.23	37.83
	Night	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	4.21	6.55	3.21	3.28	6.42
	Total	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	34.75	55.01	43.29	37.51	44.25
Non-Jets	Day	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	37.29	19.36	34.57	37.31	17.36
	Night	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	16.28	18.89	1.83	1.92	4.45
	Total	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	53.57	38.25	36.40	39.23	21.81
Total GA Operations	Day	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	73.08	77.71	81.94	76.68	58.84
	Night	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	20.89	26.17	5.68	5.71	11.29
	Total	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	93.97	103.88	87.62	82.39	70.13
Total	Day	1045.70	1025.22	1220.49	1157.07	1113.15	1077.52	1128.24	1252.00	1207.61	1223.78	1151.72	965.09
	Night	88.96	140.74	119.75	86.49	85.64	98.68	120.08	144.21	148.05	131.19	126.50	111.78
	Total[3]	1134.66	1165.96	1340.24	1243.56	1198.79	1176.20	1248.32	1396.21	1355.66	1354.97	1278.21	1076.86

Table H-9 Modeled Daily Operations by Commercial and General Aviation Aircraft[1] - 2003 to 2009 (Continued)

		2003	2004	2005	2006	2007	2008	2009
Commercial Aircraft								
Stage 2 Jets[2]	Day	0.08	0.03	0.05	0.03	0.03	0.01	0.00
	Night	0.00	0.01	0.01	0.00	0.01	0.01	0.00
	Totals	0.08	0.05	0.06	0.03	0.04	0.02	0.00
Stage 3 Jets (All)	Day	717.85	772.39	765.76	767.55	748.13	699.39	668..32
	Night	92.69	113.24	113.66	114.81	118.29	114.30	103.11
	Totals	810.54	885.63	879.42	882.36	866.42	813.69	771.43
Conventional Jets	Day	461.06	518.96	505.48	490.63	472.39	443.15	421.51
	Night	72.69	89.24	91.99	92.71	96.28	89.89	82.19
	Totals	533.75	608.20	597.47	583.34	568.66	533.04	503.70
Regional Jets	Day	256.80	253.43	260.34	276.95	275.77	256.24	246.81
	Night	19.99	24.00	21.68	22.11	22.03	24.40	20.93
	Totals	276.79	277.43	282.01	299.06	297.80	280.64	267.73
Non-Jet Aircraft	Day	135.18	133.24	148.77	140.81	145.27	132.52	136.45
	Night	2.41	3.03	3.02	3.26	3.47	4.00	5.54
	Total	137.59	136.28	151.79	144.07	148.73	136.52	141.99
Total Commercial Operations	Day	853.10	905.66	914.59	908.41	893.43	831.92	804.77
	Night	95.10	116.29	116.68	118.09	121.77	118.31	108.65
	Total	948.20	1021.95	1031.27	1026.51	1015.19	950.23	913.42
GA Aircraft								
Stage 2 Jets[2]	Day	2.84	0.94	2.29	1.90	1.24	0.36	0.09
	Night	0.26	0.14	0.25	0.17	0.19	0.03	0.01
	Total	3.10	1.08	2.54	2.07	1.43	0.38	0.10
Stage 3 Jets	Day	46.21	53.72	58.84	61.08	54.82	43.98	22.31
	Night	6.98	8.37	9.33	6.57	6.39	4.52	2.28
	Total	53.19	62.09	68.16	67.65	61.21	48.49	23.59
Non-Jets	Day	17.81	16.95	14.00	15.05	11.98	15.13	8.19
	Night	4.40	5.20	4.75	1.39	3.61	1.08	0.74
	Total	22.21	22.14	18.75	16.44	15.58	16.20	8.93
Total GA Operations	Day	66.88	71.60	75.12	78.03	68.04	59.46	29.58
	Night	11.64	13.71	14.33	8.13	10.19	5.62	3.04
	Total	78.52	85.31	89.46	86.15	78.22	65.05	32.62
Total	Day	919.98	977.27	989.71	986.43	961.46	891.39	834.35
	Night	106.74	130.00	131.02	126.22	131.96	123.93	111.69
	Total[3]	1026.72	1107.26	1120.73	1112.66	1093.42	1015.31	946.04

Source: Massport's Noise Monitoring System and Revenue Office numbers.
Note: Data from 1991 not available.
GA General Aviation
1 Includes scheduled and unscheduled operations.
2 Stage 2 aircraft are exempt from meeting newer federal Stage 3 noise limits when their maximum gross takeoff weight is less than or equal to 75,000 pounds.
3 Regional Jet operations were not tracked separately prior to 1999.
4 Totals prior to 1998 do not include GA operations.

Commercial Jet Aircraft by Part 36 Stage Category

Jet aircraft currently operating at Logan Airport are categorized by the FAA into two groups: Stage 2 and Stage 3. As described in *Chapter 6, Noise Abatement*, the designation refers to a noise classification specified in Federal Aviation Regulation (FAR) Part 36 that sets noise emission standards at three measurement locations - takeoff, landing, and sideline - based on an aircraft's maximum certificated weight. The heavier the aircraft, the more noise it is permitted to make within limits. Because of the substantial differences in noise between Stage 2, recertificated Stage 3, and new Stage 3 aircraft, Massport tracks operations by these separate categories to follow their trends. Table H-10 shows the percentage of commercial jet operations by stage category from 1999 through 2009. One of the most significant changes occurring after the economic downturn in 2001 was the almost immediate retirement of the recertificated aircraft from airlines' fleets due to their high operating costs. This type of accelerated retirement is not as prevalent during the 2008/2009 economic downturn since it is no longer the major airlines which are operating these aircraft. However, these aircraft still suffer from high operating costs and are being replaced wherever possible.

Table H-10 Percentage of Commercial Jet Operations by Part 36 Stage Category - 1999 to 2009

	New Stage 3[1]	Recertificated Stage 3[2]	Stage 2	Total
1999	70.0%	21.0%	9.0%	100%
2000	75.0%	24.0%	1.0%	100%
2001	86.3%	13.6%	0.1%	100%
2002	92.8%	7.2%	0.0%	100%
2003	95.8%	4.1%	0.01%	100%
2004	97.8%	2.2%	0.0%	100%
2005	98.0%	2.0%	0.0%	100%
2006	98.6%	1.4%	0.0%	100%
2007	98.3%	1.7%	0.0%	100%
2008	99.1%	0.9%	0.0%	100%
2009	99.2%	0.8%	0.0%	100%

Source: Massport and FAA radar data.

1 New Stage 3 aircraft are aircraft originally manufactured as a certificated Stage 3 aircraft under Federal Regulation Part 36.

2 Recertificated Stage 3 aircraft are aircraft originally manufactured as a certificated Stage 1 or 2 aircraft under Federal Regulation Part 36 which have been either treated with hushkits or have been re-engined to meet Stage 3 requirements.

Nighttime Operations

Massport tracks flights that operate between the broader DNL nighttime periods of 10:00 PM to 7:00 AM, when each flight is penalized 10 dB in calculations of noise exposure. Table H-11 shows this nighttime activity by different groups of aircraft. Nighttime flights by commercial jet operators have decreased 9.8 percent at Logan Airport compared to 2008. Commercial non-jet operations increased 38.5 percent from 2008 and general aviation traffic is down 46.0 percent at night. Overall, nighttime operations at Logan Airport decreased 10.1 percent. The majority of nighttime operations (between 10:00 PM and 7:00 AM) occurred either before midnight or after 5:00 AM.

Table H-11 Modeled Nighttime Operations at Logan Airport - 1990 to 2009

	Commercial Jets	Commercial Non-Jets	General Aviation[1]	Total
1990	77.24	11.72	NA	88.96
1991	NA[2]	NA[2]	NA[2]	NA[2]
1992	71.42	69.32	NA	140.74
1993	72.91	46.84	NA	119.75
1994	72.90	13.59	NA	86.49
1995	74.50	11.14	NA	85.64
1996	84.95	13.73	NA	98.68
1997	92.81	27.27	NA	120.08
1998	101.46	21.86	NA	123.32
1999	105.25	16.63	26.17	148.05
2000	103.92	21.58	5.68	131.19
2001	109.82	10.97	5.71	126.50
2002	97.04	3.45	11.29	111.78
2003	92.69	2.41	11.64	106.74
2004	113.26	3.03	13.71	130.00
2005	113.67	3.02	14.33	131.02
2006	114.83	3.26	8.13	126.22
2007	118.30	3.47	10.19	131.96
2008	114.30	4.00	5.62	123.93
2009	103.11	5.54	3.09	111.69
Change (2008 to 2009)	(11.19)	1.54	(2.38)	(12.55)
Percent Change	(9.79%)	38.54%	(45.98%)	(10.12%)

Source: Massport, HMMH.

1 General aviation data not available prior to 1999.

2 1991 data not available.

Jet Runway Use

Table H-12 presents a summary of runway use by jets. Since 2001, the radar data have been analyzed with Massport's PreFlight™ software. PreFlight™ is an analysis package used to compile fleet, day/night splits, and runway use information from radar data. Data prior to 2001 were derived from Massport's original noise monitoring system, supplemented with field records. Note that Logan Noise Rules prevent arrivals to Runway 22R and departures from Runway 4L by jet aircraft.

Table H-12 Summary of Jet Aircraft Runway Use - 1990 to 2000

	Runway									
	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
1990										
Departures	0%[2]	3%	21%	NA	10%	2%	36%	20%	NA	7%
Arrivals	1%	25%	0%	NA	2%	14%	0%	28%	NA	29%
1992[2]										
Departures	0%	6%	31%	NA	7%	2%	38%	10%	NA	6%
Arrivals	1%	37%	0%	NA	3%	12%	0%	30%	NA	17%
1993										
Departures	0%	9%	33%	NA	7%	3%	40%	4%	NA	4%
Arrivals	2%	44%	0%	NA	1%	11%	0%	28%	NA	15%
1994										
Departures	0%	9%	33%	NA	4%	3%	32%	12%	NA	5%
Arrivals	3%	42%	0%	NA	1%	8%	0%	27%	NA	19%
1995										
Departures	0%	8%	36%	NA	5%	5%	29%	11%	NA	5%
Arrivals	3%	41%	0%	NA	2%	8%	0%	27%	NA	17%
1996										
Departures	0%	8%	32%	NA	5%	6%	33%	12%	NA	5%
Arrivals	2%	38%	0%	NA	2%	11%	0%	29%	NA	18%
1997										
Departures	0%	8%	30%	NA	5%	6%	31%	15%	NA	5%
Arrivals	2%	36%	0%	NA	2%	9%	0%	30%	NA	20%
1998										
Departures	0%	8%	35%	NA	6%	5%	28%	14%	NA	5%
Arrivals	2%	41%	0%	NA	2%	7%	0%	28%	NA	19%
1999										
Departures	0%	8%	31%	NA	5%	4%	30%	15%	NA	6%
Arrivals	3%	37%	0%	NA	2%	10%	0%	28%	NA	21%
2000										
Departures	0%	8%	35%	NA	4%	3%	30%	15%	NA	6%
Arrivals	4%	50%	0%	NA	1%	7%	0%	28%	NA	20%

Table H-12	Summary of Jet Aircraft Runway Use - 2001 to 2009 (Continued)									
	Runway									
	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
2001										
Departures	0%	7%	34%	NA	4%	3%	35%	12%	NA	5%
Arrivals	5%	36%	0%	NA	1%	8%	0%	32%	NA	18%
2002										
Departures	0%	4%	31%	NA	6%	3%	35%	16%	NA	6%
Arrivals	6%	31%	0%	NA	1%	12%	0%	30%	NA	21%
2003										
Departures	0%	4%	33%	NA	7%	2%	34%	14%	NA	6%
Arrivals	7%	33%	0%	NA	1%	14%	0%	28%	NA	18%
2004										
Departures	0%	5%	34%	NA	10%	4%	24%	18%	NA	6%
Arrivals	6%	34%	0%	NA	1%	12%	0%	24%	NA	23%
2005										
Departures	0%	5%	36%	NA	7%	1%	31%	13%	NA	7%
Arrivals	8%	33%	0%	NA	1%	11%	0%	29%	0%	17%
2006										
Departures	0%	4%	33%	0%	3%	1%	40%	13%	-	6%
Arrivals	7%	29%	0%	-	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	0%	4%	1%	33%	7%	-	19%
Arrivals	5%	31%	0%	-	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<1%	3%	<1%	36%	6%	-	16%
Arrivals	6%	30%	-	-	2%	17%	-	33%	2%	11%
2009										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	-	16%
Arrivals	7%	31%	-	-	3%	17%	-	30%	1%	11%

Source: HMMH 2010, Massport Noise Office.

Notes: The data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use which is used by the PRAS to derive recommendations for use of a particular runway. Effective runway percentages include a factor of 10 applied to nighttime operations so that use of a runway at night more closely reflects its effect on total noise exposure.

Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.

Values may not add to 100 percent due to rounding.

1 Runway 14-32 opened in late November, 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).

2 1991 data are not available. The **1990 Final Generic Environmental Impact Report** was published and submitted to the Secretary of Environmental Affairs in July 1993. It included modeled operations and resulting noise contours for 1987, 1990, and a 1996 forecast year. The **1993 Annual Update** published in July 1994 included operations and contours for 1992 and 1993. 1991 data are not available.

NA Runway was not available. Cumulative Noise Index (CNI)

Massport reports total annual fleet noise at Logan Airport, defined in the Logan Airport Noise Rules by a metric referred to as the CNI. The CNI is a single number representing the sum of the entire set of single-event noise levels experienced at the Airport over a full year of operation, weighted similarly to DNL so that activity occurring at night is penalized by adding an extra 10 dB to each event. This penalty is mathematically equivalent to multiplying the number of nighttime events by each aircraft by a factor of 10. The Logan Airport Noise Rules define CNI in terms of EPNdB and require that the index be computed for the fleet of commercial aircraft operating at Logan Airport throughout the year. In addition, in EDRs and ESPRs, Massport reports partial CNI values of noise at Logan Airport, so that various subsets of the fleet (cargo, night operations, passenger jets, etc.) are identified.

The Noise Rules, adopted by Massport following public hearings held in February 1986, established a CNI limit of 156.5 EPNdB. The CNI generally has decreased since 1990, remaining below that cap, with changes from year to year on the order of a few tenths of a decibel. The 2009 CNI remains well below the cap of 156.5 EPNdB.

Table H-13 Cumulative Noise Index (EPNdB) - 1990 to 2002

Logan Airport CNI Cap - 156.5 EPNdB

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Full CNI (Entire Commercial Jet Fleet)	156.4	155.8	155.5	155.3	155.4	155.3	155.1	154.8	154.7	154.9	154.7	154.1	153.2
Total Passenger Jets	155.2	154.8	154.6	154.4	154.4	154.2	154.1	153.9	153.7	153.9	153.6	152.9	151.8
Total Cargo Jets	150.1	148.9	148.0	147.9	148.3	148.8	148.6	147.5	147.9	148.0	148.2	147.8	147.4
Total Daytime	152.5	152.1	152.4	152.1	152.1	151.6	151.2	150.8	150.4	150.4	149.5	149.0	148.5
Total Nighttime	154.4	153.4	152.6	152.4	152.6	152.9	152.9	152.5	152.7	153.1	153.1	152.4	151.3
Total Stage 2 Jets	NA	NA	NA	NA	151.0	150.2	149.4	149.2	147.7	147.1	124.7	121.5	114.3
Total Stage 3 Jets	NA	NA	NA	NA	153.4	153.8	153.8	153.4	153.8	154.2	154.7	154.1	153.2
Daytime Stage 2	NA	NA	NA	NA	149.0	148.5	147.6	146.5	145.2	144.1	122.6	119.3	111.2
Nighttime Stage 2	NA	NA	NA	NA	146.7	145.1	144.8	145.8	144.1	144.0	120.5	117.3	111.4
Daytime Stage 3	NA	NA	NA	NA	149.1	148.8	148.7	148.8	148.9	149.2	149.5	149.0	148.5
Nighttime Stage 3	NA	NA	NA	NA	151.4	152.1	152.2	151.5	152.1	152.5	153.1	152.4	151.3
Passenger Jet Stage 2	NA	NA	NA	NA	150.5	149.9	149.2	148.9	147.5	146.8	124.2	116.3	NA
Passenger Jet Stage 3	NA	NA	NA	NA	152.2	152.3	152.3	152.2	152.6	153.0	153.6	152.9	151.8
Cargo Jet Stage 2	NA	NA	NA	NA	141.5	137.4	136.8	137.4	139.0	134.5	114.8	119.9	114.3
Cargo Jet Stage 3	NA	NA	NA	NA	147.3	148.5	148.3	147.0	147.3	147.9	148.2	147.8	147.4
Daytime Passenger	NA	152.0	152.2	152.0	152.0	151.5	151.1	150.6	150.1	150.1	149.3	148.7	148.2
Nighttime Passenger	NA	151.6	150.9	150.6	150.8	151.0	151.0	151.1	151.2	151.6	151.6	150.8	149.4
Daytime Cargo	137.1	137.1	137.6	135.2	136.1	138.0	136.7	136.2	138.0	138.2	137.5	137.1	137.0
Nighttime Cargo	149.9	148.6	147.6	147.6	148.0	148.4	148.3	147.1	147.5	147.6	147.8	147.4	147.0
Daytime Passenger Stage 2	NA	NA	NA	NA	148.9	148.4	147.6	146.5	145.0	143.9	122.3	115.0	NA
Daytime Passenger Stage 3	NA	NA	NA	NA	149.0	148.5	148.4	148.5	148.6	149.0	149.2	148.7	148.2
Nighttime Passenger Stage 2	NA	NA	NA	NA	149.0	148.5	148.4	148.5	142.8	143.7	119.8	110.2	NA
Nighttime Passenger Stage 3	NA	NA	NA	NA	149.4	149.9	150.1	149.8	150.5	150.8	151.6	150.8	149.4
Daytime Cargo Stage 2	NA	NA	NA	NA	128.3	126.7	124.6	126.4	131.6	131.5	111.1	117.3	111.2
Daytime Cargo Stage 3	NA	NA	NA	NA	135.3	137.7	136.4	135.7	136.9	137.1	137.5	137.0	137.0
Nighttime Cargo Stage 2	NA	NA	NA	NA	141.3	137.0	136.5	137.0	138.2	131.5	112.3	116.4	111.4
Nighttime Cargo Stage 3	NA	NA	NA	NA	147.0	148.1	148.0	146.6	146.9	147.5	147.8	147.4	147.0

Table H-13 Cumulative Noise Index (EPNdB) - 2003 to 2009 (Continued)								
Logan Airport CNI Cap - 156.5 EPNdB								
	2003	2004	2005	2006	2007	2008	2009	Change from 2008
Full CNI (Entire Commercial Jet Fleet)	152.7	153.4	153.2	152.6	152.7	152.9	152.3	(0.6)
Total Passenger Jets	151.3	152.2	152.1	151.4	151.5	151.9	151.1	(0.8)
Total Cargo Jets	147.1	147.0	146.6	146.5	146.4	146.1	145.9	(0.2)
Total Daytime	148.0	148.5	148.2	147.5	147.2	147.6	147.1	(0.5)
Total Nighttime	150.9	151.7	151.6	151.0	151.2	151.4	150.7	(0.7)
Total Stage 2 Jets	114.1	118.1	NA	NA	NA	NA	NA	NA
Total Stage 3 Jets	152.7	153.4	153.2	152.6	152.7	152.9	152.3	(0.6)
Daytime Stage 2	113.7	109.4	NA	NA	NA	NA	NA	NA
Nighttime Stage 2	103.2	117.5	NA	NA	NA	NA	NA	NA
Daytime Stage 3	148.0	148.5	148.2	147.5	147.2	147.6	147.1	(0.5)
Nighttime Stage 3	150.9	151.7	151.6	151.0	151.2	151.4	150.7	(0.7)
Passenger Jet Stage 2	NA	NA	NA	NA	NA	NA	NA	NA
Passenger Jet Stage 3	151.3	152.2	152.1	151.4	151.5	151.9	151.1	(0.8)
Cargo Jet Stage 2	114.1	118.1	NA	NA	NA	NA	NA	NA
Cargo Jet Stage 3	147.1	147.0	146.6	146.5	146.4	146.1	145.9	(0.2)
Daytime Passenger	147.7	148.2	147.9	147.2	146.9	147.3	146.8	(0.5)
Nighttime Passenger	148.8	150.0	150.1	149.3	149.7	150.0	149.1	(0.9)
Daytime Cargo	136.2	135.7	135.8	135.5	135.8	135.8	135.2	(0.6)
Nighttime Cargo	146.8	146.7	146.2	146.1	146.0	145.6	145.5	(0.1)
Daytime Passenger Stage 2	NA	NA	NA	NA	NA	NA	NA	NA
Daytime Passenger Stage 3	147.7	148.2	147.9	147.2	146.9	147.3	146.8	(0.5)
Nighttime Passenger Stage 2	NA	NA	NA	NA	NA	NA	NA	NA
Nighttime Passenger Stage 3	148.8	150.0	150.1	149.3	149.7	150.0	149.1	(0.9)
Daytime Cargo Stage 2	113.7	109.4	NA	NA	NA	NA	NA	NA
Daytime Cargo Stage 3	136.1	135.7	135.8	135.5	135.8	135.8	135.2	(0.6)
Nighttime Cargo Stage 2	103.2	117.5	NA	NA	NA	NA	NA	NA
Nighttime Cargo Stage 3	146.8	146.7	146.2	146.1	146.0	145.6	145.5	(0.1)

Source: HMMH 2009

Notes: General aviation and non-jet aircraft are not included in the calculation.
No operations by this aircraft type in the commercial fleet.

Flight Track Monitoring Report

Introduction

As part of its ongoing commitment to mitigate noise at Logan Airport, Massport has undertaken evaluating the flight tracks of turbojet aircraft engaged in the implementation of established FAA noise abatement procedures. As is true for any airport operator, however, Massport has no authority to control where individual aircraft actually fly. That remains the responsibility of the FAA, while the individual pilots are responsible for safely executing the FAA's instructions. The flight procedures, which are used by the Air Traffic Control (ATC) staff at Boston Tower to achieve desired noise abatement tracks, are contained in the FAA's Tower Order BOS TWR 7040.1.

This is the eighth annual report for Flight track monitoring; prior to 2002 Massport had issued semi-annual reports, an outgrowth of the Flight Track Monitoring Program study. That study was contained in the *Generic Environmental Impact Report* filed with Massachusetts Environmental Policy Act (MEPA) in July of 1996, and was the subject of two Community Working Group (CWG) workshops in September and October of 1996. The time period covered by this report is January 1 through December 31, 2009. Massport's consultants prepared the work.

The purpose of the ongoing monitoring program is to identify any systematic changes in flight tracks that may occur and to reduce flight track dispersion, where appropriate. The next report will cover the period January 1, 2010 through December 31, 2010, and will be included in the *2010 EDR*.

FAA Air Traffic Control Procedures

FAA Tower Order BOS TWR 7040.1 entitled "Noise Abatement" describes the series of noise abatement policies, rules, regulations, and the procedures to be followed by the FAA air traffic controllers in meeting their designated responsibilities to be "a good neighbor, while meeting our operational objectives/responsibilities to the National Airspace System (NAS)." Section 7.3 of the Order, subtitled "Turbojet Departure Noise Abatement Procedures" lists that all turbojet departures shall be issued the Standard Instrument Departure (SID) procedure appropriate for the departure runway. They are paraphrased from the Logan Four SID below.

Note in the descriptions that follow that terms such as "BOS 2 DME" are used frequently. Here, BOS refers to an aid to navigation known as the BOSTON VORTAC, a radio beacon physically located on the Airport near the eastern shoreline between the ends of Runways 27 and 33L. DME refers to "Distance Measuring Equipment," a co-located aid to navigation that provides pilots with a cockpit display of the number of nautical miles that the aircraft is from the designated radio beacon. Thus, BOS 2 DME means an aircraft should be two nautical miles away from the BOSTON VORTAC. The term "vectored" means the pilot is assigned to fly a magnetic heading given by and at the discretion of the FAA air traffic controller in order to maintain the safe separation of aircraft. "MSL" means feet above mean sea level--the indicator of aircraft altitude used both by the pilot in the cockpit and the air traffic controller on the ground.

On February 14, 2008, several of the conventional-only or radar vector procedures from the Boston Logan Airport Noise Study (BLANS) CATEX[3] were implemented. These procedures primarily affected departures flying over the North and South shores and were designed to increase the amount of jet traffic crossing back over land above 6,000 feet to minimize noise impacts to communities.

3 Federal Aviation Administration Categorical Exclusion Record of Decision, Issued October 16, 2007

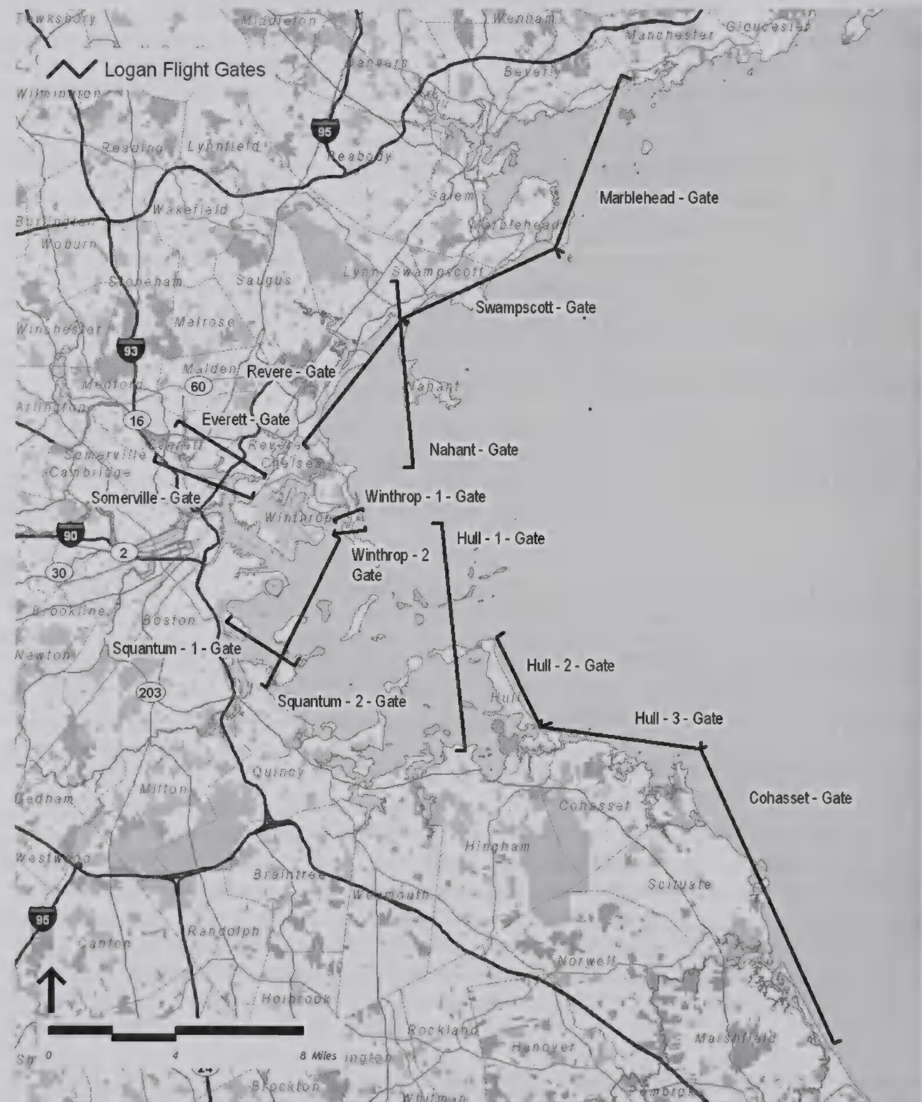
- For departures from Runway 4R, the noise abatement procedure in the Tower Order is:
  - Fly heading 036 degrees until the BOS 4 DME, then turn right to a heading of 090 degrees, then expect radar vectors to assigned Route/Navaid/Fix. Aircraft that are vectored over water can expect to cross the coastline above 6,000 MSL before proceeding on course.
  - For Runway 9, the procedure is: Fly heading 093 degrees, then expect radar vectors to assigned Route/Navaid/Fix. Aircraft that are vectored over water can expect to cross the coastline above 6,000 MSL before proceeding on course.
  - For Runway 14, the procedure is: Fly heading 142 degrees until the BOS 1 DME, then turn left to heading 120 degrees, then expect radar vectors to assigned Route/Navaid/Fix. Aircraft that are vectored over water can expect to cross the coastline above 6,000 MSL before proceeding on course.
  - For Runway 15R, the procedure is: Fly heading 151 degrees until the BOS 1 DME then turn left to 120 degrees, then expect radar vectors to assigned Route/Navaid/Fix. Aircraft that are vectored over water can expect to cross the coastline above 6,000 MSL before proceeding on course.
  - For Runway 22R and 22L: Turn left to a heading of 140 degrees, then expect radar vectors to assigned Route/Navaid/Fix. Aircraft that are vectored over water can expect to cross the coastline above 6,000 MSL before proceeding on course.

- For Runway 27:
  - LOGAN FOUR SID: Fly heading 273 until the BOS 2.2 DME, then turn left heading 235 degrees then expect radar vectors to assigned Route/Navaid/Fix.
  - WYLLY SEVEN RNAV (for turbojet aircraft only). Climb heading 273 degrees to 760 MSL, then climbing turn on 235 degrees course to WYLYY waypoint. Cross WYLYY at or above 2300′. This procedure keeps most jet traffic in a well defined flight corridor.

- For Runway 33L: Fly heading 331 degrees until the BOS 2 DME then turn left to 316 degrees, then expect radar vectors to assigned Route/Navaid/Fix.

These brief procedural statements form the basis of the verbal instructions and flight clearances that are passed from controller to pilot in order to achieve reduced noise in the communities surrounding Logan Airport while also maintaining the safe and efficient flow of aircraft in and out of the Airport. However, the consistency with which these procedures can be implemented varies due to air traffic demands, controller workloads, weather conditions, and other operational factors, as noted in the Flight Track Monitoring Program Study.

Figure H-3 Logan Airport Gates



Statistical Analyses of Flight Tracks - Runway 4R

The Nahant Gate (Figure H-3) monitors aircraft after the first turn at 4 DME. The Swampscott and Marblehead Gates monitor northbound shoreline crossings, while the Hull 2, Hull 3, and Cohasset Gates monitor southbound shoreline crossings.

Table H-14 shows the dispersion of the jet departures on Runway 4R as they pass through the Nahant Gate. Table H-15 shows that Runway 4R departures were concentrated, with 89.7 percent "over the Causeway," and about 0.3 percent over the south end of the gate compared to 87.7 percent over the Causeway in 2008 and 0.8 percent over the south end of the gate. Departures through the north end of the gate decreased from 10.7 percent in 2008 to 10.0 percent in 2009.

Table H-14 Runways 4R/4L Nahant Gate Summary for 2009

	Number of Tracks Through	Total Number of Tracks	Percentage of Tracks
North End of Gate	954	9513	10.0%
Over Causeway	8,529	9513	89.7%
South End of Gate	30	9513	0.3%
Total	9513	9513	100.0%

Source: Massport, HMMH.

Table H-15 shows how many of the shoreline crossings from Runway 4R were above 6,000 feet. For 2009, 97.1 percent of the flights were above 6,000 feet compared to 95.4 percent in 2008. The Swampscott gate had 60.3 percent of flights above 6,000 feet compared to 37.5 percent in 2008. The number of flights through the Swampscott gate decreased in 2009 (280 in 2008, down to 126 in 2009). The crossing percentage for this gate is historically lower than most gates due to its proximity to the Nahant gate itself. As seen in Figure H-3, the Swampscott gate is adjacent to the Nahant gate and aircraft would have to climb very quickly in order to be above 6,000 feet when crossing the Swampscott gate.

Table H-15 Runways 4R/4L Shoreline Crossings Above 6,000 Feet for 2009

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	126	76	60.3%
Marblehead Gate	2,139	2,075	97.0%
Hull 2 Gate	771	767	99.5%
Hull 3 Gate	1,116	1,099	98.5%
Cohasset Gate	772	763	98.8%
Total	4,924	4,780	97.1%

Source: Massport, HMMH.

Statistical Analyses of Flight Tracks - Runway 9

The Winthrop 1 and Winthrop 2 gates (Figure H-3) monitor early turns for departures off Runway 9. The Revere, Swampscott, or Marblehead gates monitor northbound shoreline crossings, while the Hull 2, Hull 3, or Cohasset gates monitor southbound shoreline crossings.

Table H-16 shows how many tracks turned prior to the BOS 2 DME. Northbound turns before BOS 2 DME pass through the Winthrop 1 Gate. Southbound traffic would pass through the Winthrop 2 Gate. In 2009, between both gates there were a total of 66 such turns, or about 0.1 percent. This is a substantial decline from 2008 when about 0.4 percent of the departures passed through one of the two gates.

Table H-16 Runway 9 Gate Summary - Winthrop Gates 1 and 2 for 2009

	Number of Departure Tracks	Number of Tracks Through Gate	Percent Turning Before BOS 2 DME
Winthrop 1 Gate	49,914	18	< 0.1%
Winthrop 2 Gate	49,914	48	0.1%
Total	49,914	66	0.1%

Source: Massport, HMMH.

Table H-17 indicates that 97.1 percent of Runway 9 departures were above 6,000 feet when crossing the shoreline, as compared with 99.1 percent in 2008. The Revere gate increased slightly from 79.7 percent in 2008 to 80.0 percent in 2009 and the Swampscott gate dropped slightly from 93.9 percent in 2007 to 93.1 percent in 2009. The Marblehead gate had an increase in crossings (from 8,662 in 2008 to 9,651 in 2009) , but a decline in the percent above 6,000 feet (from 99.5 percent in 2008 to 97.5 percent in 2009). The Hull gates also declined in percent above 6,000 feet, from approximately 99 percent in 2008 to approximately 97 to 98 percent in 2009. The Cohasset gate declined in crossings (from 8,790 in 2008 to 8,147 in 2009) and the percent above 6,000 feet declined from over 99 percent in 2008 to 97.6 percent in 2009.

Table H-17 Runway 9 Shoreline Crossings Above 6,000 Feet for 2009

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	85	68	80.0%
Swampscott Gate	842	784	93.1%
Marblehead Gate	9,651	9,413	97.5%
Hull 2 Gate	3,554	3,497	98.4%
Hull 3 Gate	16,827	16,261	96.6%
Cohasset Gate	8,147	7,947	97.6%
Total	37,970	39,106	97.1%

Source: Massport, HMMH.

Statistical Analyses of Flight Tracks - Runway 15R

After takeoff, Runway 15R departures turn left approximately 30 degrees to avoid Hull, head out over Boston Harbor, and return back over the shore through the Swampscott and Marblehead Gates (Figure H-3) to the north, or through the Hull 2, Hull 3, and Cohasset Gates to the south.

Table H-18 indicates that 97.0 percent of Runway 15R departures were above 6,000 feet when crossing the shoreline, as compared with 98.5 percent in 2008. At 97.9 percent, the percent above 6,000 feet for the Swampscott remained the same in 2009 as in 2008. The Marblehead gate had a decrease in crossings (from 1,079 in 2008 to 832 in 2009) and a slight decline in the percent above 6,000 feet (from 99.8 percent in 2009 to 99.3 percent in 2009). The Hull 2 gate increased its percentage from 96.9 percent in 2008 to 97.7 percent in 2009, and the Hull 3 gate decreased from 97.1 percent in 2008 to 94.1 percent in 2009). The Cohasset gate had a decrease in crossings (from 1,370 in 2009 to 927 in 2009) and the percent above 6,000 feet decreased from 100.0 percent to 97.7 percent.

Table H-18 Runway 15R Shoreline Crossings Above 6,000 Feet for 2009

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	188	184	97.9%
Marblehead Gate	832	826	99.3%
Hull 2 Gate	126	123	97.7%
Hull 3 Gate	1,017	957	94.1%
Cohasset Gate	927	906	97.7%
Total	3,090	2,996	97.0%

Source: Massport, HMMH.

Statistical Analyses of Flight Tracks - Runways 22R/22L

The Squantum 2 and Hull 1 Gates (Figure H-3) are used to monitor the turn to 140 degrees over Boston Harbor and north of Hull. The shoreline gates are used to monitor shoreline crossings, as for Runways 4R, 9, and 15R above.

Table H-19 shows the dispersion of the jet departures from Runways 22R-22L as they pass through the Squantum 2 Gate. The first segment of the gate is the northernmost segment and is primarily over Boston Harbor. The other segments extend southward toward Quincy. Similar to 2008, over 90 percent of the flights were over the first two segments of this gate in 2009.

Table H-19 Runways 22R/22L Squantum 2 Gate Summary for 2009

	Number of Tracks Through Gate Segment	Total Number of Tracks Through Gate	Percentage of Tracks Through Gate Segment
0 - 12,000 ft	38,522	52,074	74.0%
12,000 - 14,000 ft	9,523	52,074	18.3%
14,000 - 21,000 ft	3,991	52,074	7.7%
21,000 - 27,000 ft	38	52,074	0.1%
Total	52,074	52,074	100.0%

Source: Massport, HMMH.
Note: Percentages sum to more than 100 percent due to rounding.

Table H-20 shows that 96.6 percent of the tracks were north of the Hull peninsula as they passed through the Hull 1 Gate, which is the same percentage as 2008.

Table H-20 Runways 15R/22R/22L Gate Summary - North of Hull Peninsula for 2009

	Number of Tracks Through Gate	Number of Tracks North of Hull Peninsula	Percentage of Tracks North of Hull Peninsula
Hull 1 Gate	52,722	54,608	96.6%

Source: Era multilateration and HMMH Analysis.

Table H-21 indicates that 98.4 percent of Runway 22R/22L departures were above 6,000 feet when crossing the shoreline, as compared with 99.4 percent in 2008. For the Revere gate, the percent above 6,000 feet increased from 97.0 percent in 2009 to 98.3 percent in 2009. The Swampscott gate also increased from 99.6 percent in 2008 to 99.8 percent in 2009. The Marblehead gate had an increase in crossings (from 6,381 in 2008 to 7,497 in 2009) and increased the percent above 6,000 feet (from 99.6 percent in 2008 to 99.7 percent in 2009). The Hull gates to the south both decreased in percent above 6,000 feet from 99.2 percent in 2008 to 98.1 percent for Hull 2; and from 99.1 percent in 2008 to 97.5 percent for Hull 3. The number of crossings for the Cohasset gate remained about the same (9,494 in 2008 versus 9,541 in 2009) and the percentage decreased from 99.8 percent in 2008 to 98.1 percent in 2009.

Table H-21 Runways 22R/22L Shoreline Crossings Above 6,000 Feet for 2009

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	240	236	98.3%
Swampscott Gate	5,191	5,182	99.8%
Marblehead Gate	7,497	7,476	99.7%
Hull 2 Gate	931	913	98.1%
Hull 3 Gate	17,675	17,232	97.5%
Cohasset Gate	9,541	9,360	98.1%
Total	41,075	40,399	98.4%

Source: Massport, HMMH.

Runway 27

On September 15, 1996, the FAA implemented a new departure procedure for Runway 27 called the WYLYY RNAV procedure. In accordance with the provisions of the Record of Decision issued for the Runway 27 EIS, Massport has been providing on-going radar flight track data and analysis to the FAA with respect to the new procedure. Table H-22 presents the results for the Runway 27 corridor complied for 2009. In October of 2009, FAA implemented a change (WYLYY SEVEN) designed to improve adherence to the corridor, but as evident from the table the change has not resulted in an improvement. The average percentage of tracks through the corridor was 50.2 percent, a decrease from 52.9 percent for 2008.

Table H-22 Runway 27 Corridor Percent of Tracks Through Each Gate for 2009

Month	Total # of Tracks	Total # of Tracks Through All Gates	Percent of Tracks Through All Gates	Gate A 1,400 ft[1]	Gate B 2,200 ft[1]	Gate C 2,900 ft[1]	Gate D 4,700 ft[1]	Gate E 6,300 ft[1]	Average Percent Through Each Gate
January	1753	821	46.8%	55.2%	76.8%	88.7%	95.0%	92.9%	81.7%
February	771	386	50.1%	59.3%	72.2%	85.6%	92.5%	88.7%	79.7%
March	932	519	55.7%	60.9%	75.5%	89.5%	96.6%	94.4%	83.4%
April	652	367	56.3%	66.1%	77.0%	90.2%	95.6%	93.7%	84.5%
May	341	194	56.9%	59.2%	76.8%	85.6%	93.3%	92.1%	81.4%
June	146	96	65.8%	69.2%	78.1%	91.8%	96.6%	95.9%	86.3%
July	400	220	55.0%	59.5%	74.5%	86.0%	92.5%	91.3%	80.8%
August	247	140	56.7%	60.3%	72.5%	83.4%	86.6%	84.2%	77.4%
September	--	--	--	--	--	--	--	--	--
October	338	216	63.9%	70.4%	79.0%	90.2%	92.9%	91.7%	84.9%
November	775	365	47.1%	53.7%	78.8%	89.0%	93.4%	92.0%	81.4%
December	1463	599	40.9%	49.1%	75.0%	84.2%	89.4%	88.2%	77.2%
Average	652	327	50.2%	60.3%	76.0%	87.7%	93.1%	91.4%	81.7%

Source: PASSUR and Massport 2010 Analysis

Note: There were no jet departures on Runway 27 during the month of September.

1 Width of Each Gate in Feet.

Statistical Analyses of Flight Tracks - Runway 33L

The Somerville and Everett Gates (Figure H-3) extend from BOS 2 DME to BOS 5 DME and are used to monitor the departure procedure for Runway 33L. Turns to the left prior to the BOS 2 DME would pass through the Somerville Gate. Turns to the right prior to the BOS 2 DME would pass through the Everett Gate. Table H-23 shows the results of the analyses. The table indicates that in 2009 8.3 percent of tracks turned prior to reaching the BOS 2 DME. This is a decrease compared to 2008 when 10.3 percent of departures turned early before reaching 2 DME.

Table H-23 Runway 33L Gates - Passages Below 3,000 Feet for 2009

	Number of Departure Tracks	Number of Tracks Turning Before BOS 2 DME	Percentage of Tracks Turning Before BOS 2 DME
Everett Gate	26,221	307	1.2%
Somerville Gate	26,221	1,875	7.2%
Total	26,221	2,182	8.3%

Source: Massport, HMMH.

INMv7.0b Contour Improvements

Figure H-4 compares the DNL 60 to 75 dB contours for 2008 created with INMv7.0b to those created with INMv7.0a. As the figure shows, the improvements to the INMv7.0b database and minor computational changes have increased the size of the contours in East Boston and Winthrop.

INMv7.0b Database updates and changes included the following improvements:
Most of the current Airbus fleet had performance data updated which now allows the RealProfiles™ software to generate custom profiles for these aircraft on arrival. For INMv7.0a, these aircraft flew a fixed arrival profile.

Fourteen new aircraft types were added to the model. The most frequent type of aircraft at Logan Airport, which are affected by this are the Canadair CR700 and CR900 regional jets, which are now in the model. These aircraft were modeled with a substitution in INMv7.0a

Corrections to implementation of reverse thrust for certain flight path segments and other minor changes were also added to the model.

Source: Harris Miller Miller & Hanson Inc. 2010, Massport NOMS / ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

2008 DNL Contour (INM 7.0b)

2008 DNL Contour (INM 7.0a)

Comparison of the DNL 60 to 75 dB Contours for 2008 Operations Using INMv7.0a and INMv7.0b

Figure H-4

I

Air Quality/ Emissions Reduction

This appendix provides the following detailed information and tables in support of *Chapter 7, Air Quality/ Emissions Reduction*:

- 2009 Aircraft Fleet and Operational Data Used in EDMS v5.1.2
  - Table I-1 – 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type

- Ground Service Equipment/Alternative Fuels Conversion
  - Table I-2 – Ground Service Equipment Alternative Fuel Conversion Summary (kg/day)

- Motor Vehicle Emissions
  - Table I-3 – MOBILE6.2.03 Input File
  - Table I-4 – MOBILE6.2.03 Output Files

- Fuel Storage and Handling
  - Table I-5 – Fuel Throughput by Fuel Category (gallons)

- Stationary Sources
  - Table I-6 – Stationary Source Fuel Throughput by Fuel Category (gallons)

- 1993 – 2003 Emissions Inventories
  - Table I-7 – Estimated VOC Emissions (in kg/day) at Logan Airport
  - Table I-8 – Estimated NO_X Emissions (in kg/day) at Logan Airport
  - Table I-9 – Estimated CO Emissions (in kg/day) at Logan Airport

- Greenhouse Gas (GHG) Emissions Inventory
  - Table I-10 – Logan Airport GHG Inventory Input Data & Information
  - Table I-11 – GHG Emission Factors
  - Table I-12 – GHG Emissions
  - Table I-13 – Logan Airport GHG Emissions Compared to Massachusetts Totals
  - Table I-14 - Comparison of Annual Estimated Total Greenhouse Gas Emissions (MMT of CO_2eq) at Logan Airport – 2007 through 2009

2009 Aircraft Fleet and Operational Data used in EDMS Version 5.1.2

The Federal Aviation Administration (FAA) Emissions Dispersion System (EDMS) is the United States (U.S.) Environmental Protection Agency (EPA)-preferred and the FAA-required model for conducting airport air quality analyses. The most recent version of EDMS, Version 5.1.2 (EDMS v5.1.2), was used in support of the *2009 Environmental Data Report (2009 EDR)* Air Quality Analysis. Table I-1 contains the data that was used in EDMS v5.1.2 to represent actual conditions at Logan Airport in 2009. This data includes aircraft type, engine, landing takeoff cycles (LTOs) and taxi times. The aircraft are divided into four categories: air carrier, cargo, commuter, and general aviation (GA).

Table I-1 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type

Aircraft Type	Engine	LTOs	Description (Airline)	Taxi Times
Air Carrier Aircraft				
Airbus A310-200 Series	CF6-80A3	187	AC SATA	25.27
Airbus A319-100 Series	CFM56-5A4	15	AC ACA	25.27
Airbus A319-100 Series	CFM56-5B5/P	37	AC Frontier	25.27
Airbus A319-100 Series	CFM56-5B6/P	875	AC NWA	25.27
Airbus A319-100 Series	CFM56-5B6/P	971	AC Spirit	25.27
Airbus A319-100 Series	V2522-A5	1,553	AC UAL	25.27
Airbus A319-100 Series	CFM56-5B6/P	56	AC USA	25.27
Airbus A319-100 Series	V2524-A5	11,673	AC USA	25.27
Airbus A319-100 Series	CFM56-5B6/P	1,014	AC Virgin America	25.27
Airbus A320-200 Series	CFM56-5-A1	35	AC ACA	25.27
Airbus A320-200 Series	V2527-A5	11,567	AC JBU	25.27
Airbus A320-200 Series	CFM56-5-A1	1,151	AC NWA	25.27
Airbus A320-200 Series	V2527-A5	1,679	AC UAL	25.27
Airbus A320-200 Series	CFM56-5B4/P	11	AC USA	25.27
Airbus A320-200 Series	V2527-A5	1,942	AC USA	25.27
Airbus A320-200 Series	V2527-A5	672	AC Virgin America	25.27
Airbus A321-100 Series	CFM56-5B3/P	2	AC USA	25.27
Airbus A321-100 Series	V2530-A5	243	AC USA	25.27
Airbus A330-200 Series	CF6-80E1A3 Standard	18	AC AFR	25.27
Airbus A330-200 Series	CF6-80E1A4 Low emissions	316	AC AZA	25.27
Airbus A330-200 Series	CF6-80E1A2 1862M39	143	AC EIN	25.27
Airbus A330-200 Series	Trent 772	1	AC Etihad Airways	25.27
Airbus A330-200 Series	PW4168 Talon II	39	AC SWR	25.27
Airbus A330-300 Series	PW4168A Talon II	154	AC DLH	25.27
Airbus A330-300 Series	CF6-80E1A4 Standard	495	AC EIN	25.27
Airbus A330-300 Series	Trent 768	1	AC Garuda Indonesia	25.27
Airbus A330-300 Series	PW4168A Talon II	368	AC NWA	25.27
Airbus A340-300 Series	CFM56-5C2	86	AC AFR	25.27
Airbus A340-300 Series	CFM56-5C4/P SAC	295	AC DLH	25.27
Airbus A340-300 Series	CFM56-5C4/P SAC	240	AC Iberia	25.27
Airbus A340-300 Series	CFM56-5C4/P SAC	295	AC SWR	25.27
Airbus A340-300 Series	CFM56-5C4/P SAC	96	AC VIR	25.27
Airbus A340-600 Series	Trent 556-61 Phase 5 tiled	26	AC DLH	25.27
Airbus A340-600 Series	Trent 556-61 Phase 5 tiled	11	AC Iberia	25.27
Airbus A340-600 Series	Trent 556-61 Phase 5 tiled	237	AC VIR	25.27
Boeing 717-200 Series	BR700-715A1-30	824	AC MEP	25.27
Boeing 717-200 Series	BR700-715A1-30	4,953	AC TRS	25.27
Boeing 737-200 Series	JT8D-15A	32	AC Other Charter (domestic)	25.27
Boeing 737-200 Series	JT8D-15A	15	AC Pace	25.27
Boeing 737-300 Series	CFM56-3-B1	301	AC COA	25.27
Boeing 737-300 Series	CFM56-3-B1	458	AC UAL	25.27
Boeing 737-300 Series	CFM56-3B-2	1	AC USA	25.27
Boeing 737-300 Series	CFM56-3-B1	295	AC USA	25.27
Boeing 737-400 Series	CFM56-3B-2	14	AC Miami Air	25.27
Boeing 737-400 Series	CFM56-3B-2	6	AC USA	25.27

Table I-1 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type (Continued)

Aircraft Type	Engine	LTOs	Description (Airline)	Taxi Times
Air Carrier Aircraft (Cont'd.)				
Boeing 737-400 Series	CFM56-3B-2	1,185	AC USA	25.27
Boeing 737-500 Series	CFM56-3C-1	1,967	AC COA	25.27
Boeing 737-500 Series	CFM56-3C-1	94	AC UAL	25.27
Boeing 737-700 Series	CFM56-7B22	4	AC Aeromexico	25.27
Boeing 737-700 Series	CFM56-7B24	8	AC ASA	25.27
Boeing 737-700 Series	CFM56-7B24	778	AC COA	25.27
Boeing 737-700 Series	CFM56-7B26/2	29	AC DAL	25.27
Boeing 737-700 Series	CFM56-7B22	119	AC Sun Country	25.27
Boeing 737-700 Series	CFM56-7B24	1,301	AC SWA	25.27
Boeing 737-700 Series	CFM56-7B22	1,880	AC TRS	25.27
Boeing 737-800 Series	CFM56-7B26	386	AC AAL	25.27
Boeing 737-800 Series	CFM56-7B26	898	AC ASA	25.27
Boeing 737-800 Series	CFM56-7B26	2,138	AC COA	25.27
Boeing 737-800 Series	CFM56-7B26	2,695	AC DAL	25.27
Boeing 737-800 Series	CFM56-7B26	69	AC DLH	25.27
Boeing 737-800 Series	CFM56-7B27	2	AC Dubai Air Wing	25.27
Boeing 737-800 Series	CFM56-7B26	82	AC Miami Air	25.27
Boeing 737-800 Series	CFM56-7B26	9	AC Sun Country	25.27
Boeing 737-900 Series	CFM56-7B26	3	AC ASA	25.27
Boeing 737-900 Series	CFM56-7B27	44	AC COA	25.27
Boeing 747-400 Series	PW4056 Reduced emissions	353	AC AFR	25.27
Boeing 747-400 Series	RB211-524H	428	AC BAW	25.27
Boeing 747-400 Series	CF6-80C2B1F 1862M39	317	AC DLH	25.27
Boeing 747-400 Series	PW4056	1	AC Dubai Air Wing	25.27
Boeing 747-400 Series	CF6-80C2B1F 1862M39	37	AC VIR	25.27
Boeing 757-200 Series	RB211-535E4B Phase 5	6,865	AC AAL	25.27
Boeing 757-200 Series	RB211-535E4	11	AC COA	25.27
Boeing 757-200 Series	PW2037	1,452	AC DAL	25.27
Boeing 757-200 Series	PW2037	24	AC FIN	25.27
Boeing 757-200 Series	RB211-535E4	391	AC ICE	25.27
Boeing 757-200 Series	PW2037	3	AC Miami Air	25.27
Boeing 757-200 Series	PW2037	1,083	AC NWA	25.27
Boeing 757-200 Series	RB211-535E4	17	AC Other Charter (international)	25.27
Boeing 757-200 Series	PW2037	106	AC TACV-Cabo Verde	25.27
Boeing 757-200 Series	PW2037	4,931	AC UAL	25.27
Boeing 757-200 Series	RB211-535E4	3	AC USA	25.27
Boeing 757-200 Series	RB211-535E4	599	AC USA	25.27
Boeing 757-300 Series	RB211-535E4B Phase 5	51	AC NWA	25.27
Boeing 767-200 Series	CF6-80A1	24	AC AAL	25.27
Boeing 767-300 Series	CF6-80C2B6 1862M39	1,257	AC AAL	25.27
Boeing 767-300 Series	CF6-80C2B6 1862M39	5	AC AZA	25.27
Boeing 767-300 Series	CF6-80A2	51	AC DAL	25.27
Boeing 767-300 Series	PW4060 Reduced emissions	50	AC UAL	25.27
Boeing 777-200 Series	GE90-94B DAC II	2	AC AZA	25.27
Boeing 777-200 Series	GE90-90B DAC I	636	AC BAW	25.27

Table I-1 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type (Continued)

Aircraft Type	Engine	LTOs	Description (Airline)	Taxi Times
Air Carrier Aircraft (Cont'd.)				
Boeing 777-200 Series	GE90-115B DAC	2	AC Emirates Airline	25.27
Boeing DC-9-30 Series	JT8D-9 series Reduced emissions	94	AC NWA	25.27
Boeing DC-9-40 Series	JT8D-11	210	AC NWA	25.27
Boeing DC-9-50 Series	JT8D-17 Reduced emissions	617	AC NWA	25.27
Boeing MD-82	JT8D-217 Environmental Kit	2,312	AC AAL	25.27
Boeing MD-83	JT8D-219 Environmental Kit	2,122	AC AAL	25.27
Boeing MD-88	JT8D-219 Environmental Kit	8,236	AC DAL	25.27
Boeing MD-90	V2525-D5	101	AC DAL	25.27
Bombardier Challenger 300	AE3007A1 Type 2	37	AC Bombardier Bus. Jet Sol.	25.27
Bombardier Challenger 600	ALF 502L-2	8	AC Bombardier Bus. Jet Sol.	25.27
Bombardier Learjet 45	TFE731-2-2B	34	AC Bombardier Bus. Jet Sol.	25.27
Bombardier Learjet 60	TFE731-2/2A	15	AC Bombardier Bus. Jet Sol.	25.27
Cessna 550 Citation II	JT15D-4 series	2	AC JZA	25.27
Embraer ERJ170	CF34-8E5A1 LEC	1,363	AC ACA	25.27
Embraer ERJ190	CF34-10E	96	AC ACA	25.27
Embraer ERJ190	CF34-10E	8,652	AC JBU	25.27
Embraer ERJ190	CF34-10E	19	AC USA	25.27
Embraer ERJ190	CF34-10E	3,060	AC USA	25.27
Raytheon Super King Air 300	PT6A-60A	4	AC Provincial Airlines	25.27
Total Air Carrier Aircraft LTOs		102,775		
Cargo Aircraft				
Airbus A300B4-200 Series	CF6-50C2 Low emissions fuel nozzle	77	Cargo DHL/Astar	25.27
Airbus A300F4-600 Series	CF6-80C2A5F 1862M39	310	Cargo FDX	25.27
Airbus A300F4-600 Series	PW4158 Reduced smoke	614	Cargo UPS	25.27
Airbus A310-200 Series	JT9D-7R4E, -7R4E1	7	Cargo FDX	25.27
Boeing 727-200 Series	JT8D-15 Reduced emissions	83	Cargo Capital Cargo International	25.27
Boeing 727-200 Series	JT8D-15 Reduced emissions	9	Cargo DHL/Astar	25.27
Boeing 727-200 Series	JT8D-15 Reduced emissions	262	Cargo FDX	25.27
Boeing 757-200 Series	PW2040	34	Cargo UPS	25.27
Boeing 767-200 Series	CF6-80A	138	Cargo Airborne Express	25.27
Boeing 767-300 ER	CF6-80C2B7F 1862M39	33	Cargo UPS	25.27
Boeing DC-10-10 Series	CF6-6D	972	Cargo FDX	25.27
Boeing DC-8 Series 70	CFM56-2A series	135	Cargo Air Transport International	25.27
Boeing DC-8 Series 70	CFM56-2A series	54	Cargo DHL/Astar	25.27
Bombardier Learjet 45	TFE731-2-2B	4	Cargo FDX	25.27
Piper PA-31 Navajo	TIO-540-J2B2	436	Cargo Airnet	25.27
Raytheon Beech Baron 58	TIO-540-J2B2	181	Cargo Airnet	25.27
Total Cargo Aircraft LTOs		3,349		

Table I-1 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type (Continued)

Aircraft Type	Engine	LTOs	Description (Airline)	Taxi Times
Commuter Aircraft				
Bombardier CRJ-100	CF34-3A1 LEC II	5,098	Comm Delta Connection	25.27
Bombardier CRJ-100	CF34-3B	1,076	Comm JZA	25.27
Bombardier CRJ-200	CF34-3B	52	Comm Chautaugua	25.27
Bombardier CRJ-200	CF34-3B	82	Comm Delta Connection	25.27
Bombardier CRJ-200	CF34-3B	1,108	Comm Delta Connection	25.27
Bombardier CRJ-200	CF34-3B	1,932	Comm Delta Connection	25.27
Bombardier CRJ-200	CF34-3B	1,381	Comm JZA	25.27
Bombardier CRJ-200	CF34-3B	227	Comm United Express	25.27
Bombardier CRJ-200	CF34-3B	3,796	Comm US Airways Express	25.27
Bombardier CRJ-700	CF34-8C1	303	Comm Delta Connection	25.27
Bombardier CRJ-700	CF34-8C1	171	Comm United Express	25.27
Bombardier CRJ-900	CF34-8C5 LEC	62	Comm Delta Connection	25.27
Bombardier CRJ-900	CF34-8C5 LEC	1,387	Comm Delta Connection	25.27
Bombardier CRJ-900	CF34-8C5 LEC	75	Comm JZA	25.27
Bombardier de Havilland Dash 8 Q100	PW120A	1,251	Comm JZA	25.27
Bombardier de Havilland Dash 8 Q100	PW120A	558	Comm US Airways Express	25.27
Bombardier de Havilland Dash 8 Q300	PW123	10	Comm JZA	25.27
Bombardier de Havilland Dash 8 Q400	PW150A	309	Comm Porter Airlines	25.27
Bombardier de Havilland Dash 8 Q400	PW150A	648	Comm US Airways Express	25.27
Cessna 402	TIO-540-J2B2	18,339	Comm Cape Air	25.27
Embraer ERJ135	AE3007A1/3 Type 3 (reduced emissions)	10,724	Comm EGF	25.27
Embraer ERJ145	AE3007A1E Type 3	2,026	Comm Chautaugua	25.27
Embraer ERJ145	AE3007A1E Type 3	672	Comm Continental Express	25.27
Embraer ERJ145	AE3007A1E Type 3	8	Comm Delta Connection	25.27
Embraer ERJ170	CF34-8E5 LEC	1,192	Comm Delta Connection	25.27
Embraer ERJ170	CF34-8E5A1 LEC	2,399	Comm Republic	25.27
Embraer ERJ170	CF34-8E5 LEC	1,293	Comm Shuttle America	25.27
Embraer ERJ190	CF34-10E	49	Comm Republic	25.27
Raytheon Beech 1900-C	PT6A-65B	35	Comm US Airways Express	25.27
Saab 340-B-Plus	CT7-5	4,145	Comm US Airways Express	25.27
Total Commuter Aircraft LTOs		60,408		
General Aviation Aircraft				
Bombardier Challenger 300	AE3007A1 Type 2	166	GA	25.27
Bombardier Challenger 300	AE3007A1 Type 2	62	GA Bombardier Bus. Jet Sol.	25.27
Bombardier Challenger 600	ALF 502L-2	330	GA	25.27
Bombardier Challenger 600	ALF 502L-2	13	GA Bombardier Bus. Jet Sol.	25.27
Bombardier Global Express	BR700-710A2-20	81	GA	25.27
Bombardier Learjet 35	TFE731-2-2B	96	GA	25.27
Bombardier Learjet 40	TFE731-2-2B	15	GA Bombardier Bus. Jet Sol.	25.27
Bombardier Learjet 45	TFE731-2-2B	129	GA	25.27
Bombardier Learjet 45	TFE731-2-2B	42	GA Bombardier Bus. Jet Sol.	25.27
Bombardier Learjet 60	TFE731-2/2A	126	GA	25.27

Table I-1 2009 Fleet Mix, Annual Landing-and-Takeoff Cycles (LTOs), and Taxi/Idle Time-in-Mode by Aircraft Type (Continued)

Aircraft Type	Engine	LTOs	Description (Airline)	Taxi Times
General Aviation Aircraft (Cont'd.)				
Bombardier Learjet 60	TFE731-2/2A	25	GA Bombardier Bus. Jet Sol.	25.27
Cessna 182	IO-360-B	49	GA Angel Flight	25.27
Cessna 208 Caravan	PT6A-114	163	GA Wiggins	25.27
Cessna 525 CitationJet	JT15D-1 series	42	GA Citation Shares	25.27
Cessna 550 Citation II	JT15D-4 series	155	GA	25.27
Cessna 550 Citation II	JT15D-4 series	10	GA Citation Shares	25.27
Cessna 560 Citation Excel	JT15D-5, -5A, -5B	177	GA	25.27
Cessna 560 Citation Excel	JT15D-5, -5A, -5B	37	GA Citation Shares	25.27
Cessna 560 Citation Excel	JT15D-5, -5A, -5B	302	GA Netjets Aviation	25.27
Cessna 560 Citation V	JT15D-5, -5A, -5B	150	GA Netjets Aviation	25.27
Cessna 560 Citation XLS	JT15D-5, -5A, -5B	160	GA	25.27
Cessna 680 Citation Sovereign	PW308C Annular	31	GA Citation Shares	25.27
Cessna 680 Citation Sovereign	PW308C Annular	92	GA Netjets Aviation	25.27
Cessna 750 Citation X	AE3007C Type 1	166	GA	25.27
Cessna 750 Citation X	AE3007C Type 1	18	GA Flight Options	25.27
Cessna 750 Citation X	AE3007C Type 1	167	GA Netjets Aviation	25.27
Dassault Falcon 2000	PW308C Annular	241	GA	25.27
Dassault Falcon 2000	PW308C Annular	74	GA Netjets Aviation	25.27
Dassault Falcon 50	TFE731-3	156	GA	25.27
Dassault Falcon 900	TFE731-3	152	GA	25.27
Embraer ERJ135	AE3007A1/3 Type 3 (reduced emissions)	15	GA Flight Options	25.27
Gulfstream G400	TAY Mk611-8	382	GA	25.27
Gulfstream G400	TAY Mk611-8	45	GA Netjets Aviation	25.27
Gulfstream G500	BR700-710A1-10	203	GA	25.27
Gulfstream G500	BR700-710A1-10	16	GA Netjets Aviation	25.27
Israel IAI-1126 Galaxy	PW306A Annular	76	GA Netjets Aviation	25.27
Piaggio P.180 Avanti	PT6A-66	84	GA Wanair	25.27
Pilatus PC-12	PT6A-67B	547	GA	25.27
Piper PA-32 Cherokee Six	TIO-540-J2B2	57	GA Angel Flight	25.27
Raytheon Beech Baron 58	TIO-540-J2B2	78	GA	25.27
Raytheon Beech Bonanza 36	TIO-540-J2B2	53	GA Angel Flight	25.27
Raytheon Beechjet 400	JT15D-5, -5A, -5B	453	GA	25.27
Raytheon Beechjet 400	JT15D-5, -5A, -5B	52	GA Flight Options	25.27
Raytheon Beechjet 400	JT15D-5, -5A, -5B	44	GA Netjets Aviation	25.27
Raytheon Hawker 800	TFE731-3	386	GA	25.27
Raytheon Hawker 800	TFE731-3	31	GA Flight Options	25.27
Raytheon Hawker 800	TFE731-3	89	GA Netjets Aviation	25.27
Raytheon Super King Air 300	PT6A-60A	83	GA	25.27
Total General Aviation Aircraft LTOs		6,121		
Total Fleet LTOs		172,653		

Notes: Due to rounding of the operations (1 LTO = 2 Operations) there may be some differences (+/-) between the values reported here and those reported in Chapter 2, Activity Levels.
Aircraft taxi times are based on Logan Airport data obtained from the FAA Aviation System Performance Metrics (ASPM) database for 2009.

Ground Service Equipment/Alternative Fuels Conversion

For the 2009 analyses, ground service equipment (GSE) emissions were calculated using EDMS emission factors which are based on the EPA NONROAD2005 model in combination with the 2004 GSE time-in-mode survey and the GSE fuel types obtained from the aerodrome permit applications. In this way, the most up-to-date GSE fleet operational, conversion and emissions characteristics are used.

Table I-2 Ground Service Equipment Alternative Fuel Conversion Summary (kg/day)

Year	Pollutant	Percent Reduction	Calculated Emissions without Reduction	Reduction from AFVs	Calculated Emissions with Reduction
2000	Volatile Organic Compounds (VOCs)	13.72%	178	24	154
	Oxides of Nitrogen (NO_x)	9.87%	369	36	333
	Carbon Monoxide (CO)	12.88%	6,124	789	5,335
2001	VOCs	13.72%	166	23	143
	NO_x	9.87%	338	33	305
	CO	12.88%	5,960	768	5,193
2002	VOCs	13.6%	286	39	247
	NO_x	8.0%	350	28	322
	CO	16.3%	6,174	1,004	5,170
2003	VOCs	13.8%	263	36	227
	NO_x	8.0%	316	25	291
	CO	16.4%	5,692	934	4,758
2004	VOCs	11.9%	212	25	187
	NO_x	6.6%	357	24	333
	CO	15.4%	4,236	650	3,586
2005	VOCs	12.2%	203	25	178
	NO_x	6.9%	335	23	312
	CO	15.4%	4,175	643	3,531
	$PM_{10}/PM_{2.5}$	9.9%	11	1	10
2006	VOCs	10.7%	86	9	77
	NO_x	7.5%	324	24	300
	CO	13.8%	1,841	255	1,586
	$PM_{10}/PM_{2.5}$	10.8%	10	1	9
2007	VOCs	8.2%	85	7	78
	NO_x	5.1%	315	16	299
	CO	10.4%	2,124	220	1,904
	$PM_{10}/PM_{2.5}$	5.9%	10	<1	10
2008	VOCs	8.3%	72	6	66
	NO_x	4.8%	270	13	257
	CO	10.2%	1,792	183	1,609
	$PM_{10}/PM_{2.5}$	5.6%	16	<1	15
2009	VOCs	8.2%	61	5	56
	NO_x	4.8%	230	11	219
	CO	10.0%	1,516	152	1364
	$PM_{10}/PM_{2.5}$	3.5%	14	<1	14

Notes: 2000 and 2001 analyses used EDMS v4.03. 2002 and 2003 analyses used EDMS v4.11, which used updated emission factors from the NONROAD2002 Model. 2004 analyses used EDMS v4.21, which again used emission factors from the EPA NONROAD2002 Model. 2005 analysis used EDMS v4.5, which used emission factors from the EPA NONROAD2002 Model. 2006 analysis used EDMS v5.0.1, which used emission factors from the EPA NONROAD2005 Model. 2007 analysis used EDMS v5.0.2, which used emission factors from the EPA NONROAD2005 Model. 2008 analysis used EDMS v5.1, which used emission factors from the EPA NONROAD2005 Model. 2009 analysis used EDMS v5.1.2, which used emission factors from the EPA NONROAD2005 Model.

Motor Vehicle Emissions

The same methods that were previously used in the *2008 Environmental Data Report (2008 EDR)* were also employed to calculate motor vehicle emissions in this *2009 EDR*.

In the *2009 EDR*, the resultant emission factors were multiplied by average daily vehicle miles to calculate daily emissions. The on-airport traffic data are summarized in the vehicle miles traveled (VMT) analyses tables of *Appendix G, Ground Transportation Improvement*. Due to the new roadway configuration of the Ted Williams Tunnel, through-traffic no longer traverses Airport property. Therefore, as of 2003, emissions from these vehicles are no longer included as part of the Airport emissions inventory. Further, MOBILE6 was used to obtain vehicle emissions at idle to estimate parking and curbside motor vehicle emissions.[1] Idling emissions are determined for a unit of time and multiplied by total idling time to reach the associated emissions. The input and output files of MOBILE6.2.03 are included as Tables I-3 and I-4.

1 Idle emissions factors in grams per hour are determined by multiplying the emissions factors at 2.5 miles per hour by 2.5, in accordance with EPA guidance (*MOBILE6 Refers to Mobile5 User Information Sheet #5* EPA, July 30, 1993).

Table I-3 MOBILE6.2.03 Input File

```
* Calendar Year 2009 Generic MOBILE6 input file for Mesoscale Build/No-Build Analyses
* Filename MA09_MES.INP created by Craig Woleader, MADEP 617-348-4046, craig.woleader@state.ma.us and Marc Bennett, MADEP 617-292-5597, marc.bennett@state.ma.us
* revised 12/2/05 to include actual diesel rebuild effects
* revised 12/17/08 to include new IM program program for 2009
* revised 5/24/10 by Wayne Arner, KBE, for specific speeds
*
*************** Header Section ***************
MOBILE6 INPUT FILE
*
PARTICULATES :
POLLUTANTS : HC CO NOX CO2
DATABASE OUTPUT :
WITH FIELDNAMES :
AGGREGATED OUTPUT :
EMISSIONS TABLE : MA09_MES.tb1 REPLACE
REPORT FILE : MA09_MES.txt REPLACE
*
RUN DATA
*************** Run Section #1 ***************
> *** Summer 2009 ***

* Pollutant output format
EXPRESS HC AS VOC :
EXPAND BUS EFS :

* Mass. specific user inputs -- require external data file
REG DIST : 2005_REG.D
I/M DESC FILE : 09NEWIM.D

* Set Diesel Rebuild effects to 10% as per EPA
REBUILD EFFECTS : 0.10

STAGE II REFUELING :
91 3 84. 84.

* Inputs for LEV II
94+ LDG IMP : MA_LEV2.D
T2 EXH PHASE-IN : LEV2EXH.D
T2 EVAP PHASE-IN : LEV2EVAP.D
T2 CERT : LEV2CERT.D

* Meteorological inputs
MIN/MAX TEMP : 70.4 93.7

* Fuel inputs
```

Table I-3 MOBILE6.2.03 Input File

FUEL RVP : 6.8
FUEL PROGRAM : 2 N

DIESEL FRACTIONS :

0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.002	0.002
0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.001	0.003	0.001
0.002	0.000	0.015	0.009	0.056					
0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002
0.003	0.003	0.006	0.013	0.017					
0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002
0.003	0.003	0.006	0.013	0.017					
0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
0.006	0.005	0.012	0.012	0.017	0.015	0.014	0.016	0.017	0.014
0.018	0.016	0.021	0.048	0.065					
0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
0.006	0.005	0.012	0.012	0.017	0.015	0.014	0.016	0.017	0.014
0.018	0.016	0.021	0.048	0.065					
0.176	0.176	0.176	0.176	0.176	0.176	0.170	0.207	0.202	0.206
0.243	0.176	0.285	0.267	0.212	0.255	0.295	0.249	0.251	0.188
0.175	0.182	0.186	0.219	0.184					
0.385	0.385	0.385	0.385	0.385	0.385	0.407	0.433	0.467	0.464
0.480	0.375	0.472	0.480	0.366	0.400	0.344	0.285	0.333	0.314
0.253	0.208	0.197	0.168	0.130					
0.674	0.674	0.674	0.674	0.674	0.674	0.634	0.664	0.719	0.717
0.744	0.715	0.565	0.810	0.803	0.644	0.654	0.605	0.525	0.389
0.356	0.376	0.108	0.136	0.154					
0.830	0.830	0.830	0.830	0.830	0.830	0.845	0.860	0.840	0.819
0.813	0.610	0.686	0.570	0.733	0.607	0.729	0.685	0.725	0.631
0.350	0.305	0.186	0.209	0.343					
0.884	0.884	0.884	0.884	0.884	0.884	0.840	0.887	0.931	0.917
0.914	0.923	0.901	0.908	0.898	0.903	0.876	0.804	0.844	0.782
0.702	0.679	0.554	0.529	0.568					
0.977	0.977	0.977	0.977	0.977	0.977	0.972	0.953	0.993	0.992
0.992	0.990	0.981	0.976	0.975	0.959	0.982	0.965	0.963	0.945
0.902	0.875	0.857	0.791	0.796					
0.972	0.972	0.972	0.972	0.972	0.972	0.955	0.984	0.995	0.992
0.991	0.995	0.993	0.993	0.995	0.992	0.986	0.995	0.981	0.993
0.971	0.982	0.977	0.993	0.987					
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.000	1.000	1.000	1.000	1.000					
0.786	0.786	0.786	0.786	0.786	0.786	0.917	0.884	0.925	0.968
0.961	0.972	0.985	0.971	0.941	0.905	0.965	0.940	0.907	0.964
0.609	0.880	1.000	0.778	0.500					

Table I-3 MOBILE6.2.03 Input File

```
***************     Scenario Section     ***************

SCENARIO RECORD    : 2009 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr)
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE      : 10
DIESEL SULFUR      : 15
AVERAGE SPEED      : 2.5 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD    : 2009 15 mph - Summer
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE      : 10
DIESEL SULFUR      : 15
AVERAGE SPEED      : 15 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD    : 2009 20 mph - Summer
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE      : 10
DIESEL SULFUR      : 15
AVERAGE SPEED      : 20 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD    : 2009 25 mph - Summer
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE      : 10
DIESEL SULFUR      : 15
AVERAGE SPEED      : 25 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD    : 2009 30 mph - Summer
CALENDAR YEAR      : 2009
EVALUATION MONTH   : 7
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE      : 10
DIESEL SULFUR      : 15
AVERAGE SPEED      : 30 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD    : 2009 35 mph - Summer
CALENDAR YEAR      : 2009
```

Table I-3 MOBILE6.2.03 Input File

```
EVALUATION MONTH  : 7
PARTICULATE EF    : PMGZML.CSV  PMGDR1.CSV  PMGDR2.CSV  PMDZML.CSV  PMDDR1.CSV  PMDDR2.CSV
PARTICLE SIZE     : 10
DIESEL SULFUR     : 15
AVERAGE SPEED     : 35 Arterial 0.0 100.0 0.0 0.0

SCENARIO RECORD   : 2009 50 mph - Summer
CALENDAR YEAR     : 2009
EVALUATION MONTH  : 7
PARTICULATE EF    : PMGZML.CSV  PMGDR1.CSV  PMGDR2.CSV  PMDZML.CSV  PMDDR1.CSV  PMDDR2.CSV
PARTICLE SIZE     : 10
DIESEL SULFUR     : 15
AVERAGE SPEED     : 50 Arterial 0.0 100.0 0.0 0.0



***************   End of This Run   ***************
END OF RUN
```

Table I-4 MOBILE6.2.03 Output Files

```
*****************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                              *
* Input file: MA09_ALL.INP (file 1, run 1).                               *
*****************************************************************************
* *** Summer 2009 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.998    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.998    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.998    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.999    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.998    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
          0.999    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)
 M 49 Warning:
           1.00    MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: 09NEWIM.D
* 15 Year Exemption Age
* New Annual OBD Exhaust I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Exhaust I/M program for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
* New Annual OBD Evap I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Evap I/M program for for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
 M601 Comment:
         User has enabled STAGE II REFUELING.
```

Table I-4 MOBILE6.2.03 Output Files

```
* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

 Reading User Supplied Tier2 Exhaust bin phase-in fractions

   Data read from file: LEV2EXH.D


 Reading User Supplied Tier2 EVAP phase-in fractions

   Data read from file: LEV2EVAP.D


 Reading User Supplied Tier2 50K certification standards

   Data read from file: LEV2CERT.D

 M616 Comment:
          User has supplied post-1999 sulfur levels.
 M614 Comment:
          User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr)
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
```

Table I-4 MOBILE6.2.03 Output Files

M583 Warning:
The user supplied arterial average speed of 2.5
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
data file: TECH12.D
M 48 Warning:
there are no sales for vehicle class HDGV8b
HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

* Reading Ammonia (NH3) Basic Emissiion Rates
* from the external data file PMNH3BER.D

* Reading Ammonia (NH3) Sulfur Deterioration Rates
* from the external data file PMNH3SDR.D

LEV phase-in data read from file MA_LEV2.D
Calendar Year: 2009
Month: July
Altitude: Low
Minimum Temperature: 70.4 (F)
Maximum Temperature: 93.7 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: No
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3386	0.3823	0.1504		0.0368	0.0004	0.0014	0.0862	0.0039	1.0000
Fuel Economy (mpg):	24.1	18.6	14.2	17.1	9.9	31.5	18.3	7.3	50.0	16.4
Composite Emission Factors (g/mi):										
Composite VOC :	3.914	2.571	2.788	2.632	3.912	0.888	0.776	1.250	12.19	3.028
Composite CO :	16.94	12.98	15.27	13.63	32.53	4.327	2.018	8.453	120.29	15.395
Composite NOX :	1.006	0.911	1.380	1.044	1.450	1.240	0.887	12.077	1.12	1.998
Composite CO2 :	368.2	478.0	622.9	518.9	896.2	323.2	554.6	1403.2	177.4	556.65

Veh. Type:	GasBUS	URBAN	SCHOOL
VMT Mix:	0.0003	0.0009	0.0016

Table I-4 MOBILE6.2.03 Output Files

```
Fuel Economy (mpg):     6.4     4.3     6.2
------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
   Composite VOC :   2.959    1.023    1.570
   Composite CO  :   45.79   13.094    7.269
   Composite NOX :   2.288   20.080   14.223
   Composite CO2 :  1375.3   2346.0   1646.5
------------------------------------------------------------------------------------------

*########################
* 2009 15 mph - Summer
* File 1, Run 1, Scenario 2.
*########################

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
        The user supplied arterial average speed of 15.0
        will be used for all hours of the day.  100% of VMT
        has been assigned to the arterial/collector roadway
        type for all hours of the day and all vehicle types.
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
              Calendar Year:  2009
                     Month:  July
                  Altitude:  Low
         Minimum Temperature:  70.4 (F)
         Maximum Temperature:  93.7 (F)
           Absolute Humidity:   75. grains/lb
```

Table I-4 MOBILE6.2.03 Output Files

```
          Fuel Sulfur Content:  30. ppm

          Exhaust I/M Program: Yes
            Evap I/M Program: Yes
                ATP Program: No
            Reformulated Gas: Yes

      Vehicle Type:    LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV     MC   All Veh
            GVWR:              <6000    >6000    (All)
                      ------  ------   ------   ------  ------  ------  ------  ------  ------  ------
    VMT Distribution:  0.3386  0.3823  0.1504            0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
  Fuel Economy (mpg):    24.1    18.6    14.2    17.1     9.9    31.5    18.3     7.3    50.0    16.4
  ------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
     Composite VOC :   0.652   0.479   0.584   0.509   0.864   0.572   0.480   0.692    4.58   0.602
     Composite CO  :    5.81    5.24    6.07    5.47   12.15   2.181   0.973   3.433   25.25   5.727
     Composite NOX :   0.548   0.546   0.836   0.628   1.638   0.810   0.576   7.888    1.01   1.266
     Composite CO2 :   368.2   478.0   622.9   518.9   896.2   323.2   554.6  1403.2   177.4  556.65
  ------------------------------------------------------------------------------------------
        Veh. Type:   GasBUS    URBAN    SCHOOL
                     ------   ------    ------
          VMT Mix:   0.0003   0.0009    0.0016
  Fuel Economy (mpg):     6.4      4.3       6.2
  ------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
     Composite VOC :   0.882    0.566    0.869
     Composite CO  :   17.11    5.319    2.953
     Composite NOX :   2.586   12.721    9.006
     Composite CO2 :  1375.3   2346.0   1646.5
  ------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 20 mph - Summer
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
```

Table I-4 MOBILE6.2.03 Output Files

```
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
        The user supplied arterial average speed of 20.0
        will be used for all hours of the day.  100% of VMT
        has been assigned to the arterial/collector roadway
        type for all hours of the day and all vehicle types.
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
          Calendar Year:  2009
                  Month:  July
               Altitude:  Low
    Minimum Temperature:  70.4 (F)
    Maximum Temperature:  93.7 (F)
      Absolute Humidity:  75. grains/lb
     Fuel Sulfur Content:  30. ppm

     Exhaust I/M Program:  Yes
         Evap I/M Program:  Yes
             ATP Program:  No
        Reformulated Gas:  Yes

   Vehicle Type:    LDGV  LDGT12  LDGT34   LDGT    HDGV    LDDV    LDDT    HDDV     MC  All Veh
       GVWR:              <6000   >6000   (All)
                 ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
  VMT Distribution:  0.3386  0.3823  0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
Fuel Economy (mpg):    24.1    18.6    14.2    17.1     9.9    31.5    18.3     7.3    50.0    16.4
--------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
  Composite VOC :   0.571   0.416   0.506   0.441   0.687   0.502   0.414   0.568    4.13   0.520
  Composite CO  :    5.31    4.87    5.64    5.09    9.03   1.821   0.798   2.593   20.08   5.144
  Composite NOX :   0.489   0.497   0.766   0.573   1.714   0.726   0.516   7.071    1.06   1.149
  Composite CO2 :   368.2   478.0   622.9   518.9   896.2   323.2   554.6  1403.2   177.4  556.65
--------------------------------------------------------------------------------------------
     Veh. Type:   GasBUS   URBAN   SCHOOL
                 ------  ------  ------
       VMT Mix:   0.0003  0.0009  0.0016
Fuel Economy (mpg):    6.4     4.3     6.2
--------------------------------------------------------------------------------------------
```

Table I-4 MOBILE6.2.03 Output Files

```
Composite Emission Factors (g/mi):
   Composite VOC :    0.693    0.464    0.713
   Composite CO  :   12.71     4.017    2.230
   Composite NOX :    2.705   11.285    7.987
   Composite CO2 :  1375.3   2346.0   1646.5
------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 25 mph - Summer
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
        The user supplied arterial average speed of 25.0
        will be used for all hours of the day.  100% of VMT
        has been assigned to the arterial/collector roadway
        type for all hours of the day and all vehicle types.
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
             Calendar Year:  2009
                    Month:  July
                 Altitude:  Low
        Minimum Temperature:  70.4 (F)
        Maximum Temperature:  93.7 (F)
          Absolute Humidity:  75. grains/lb
         Fuel Sulfur Content:  30. ppm
```

Table I-4 MOBILE6.2.03 Output Files

```
          Exhaust I/M Program: Yes
            Evap I/M Program: Yes
               ATP Program: No
            Reformulated Gas: Yes

    Vehicle Type:   LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV     MC  All Veh
         GVWR:              <6000    >6000    (All)
                 ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823  0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
Fuel Economy (mpg):    24.1     18.6     14.2     17.1     9.9     31.5     18.3     7.3     50.0     16.4
--------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
  Composite VOC :   0.527   0.384   0.465   0.407   0.579  0.450   0.366   0.476    3.85   0.474
  Composite CO  :   5.11    4.72    5.47    4.93    7.08   1.589   0.685   2.049   16.91   4.862
  Composite NOX :   0.453   0.468   0.723   0.540   1.789  0.673   0.477   6.557    1.12   1.077
  Composite CO2 :  368.2   478.0   622.9   518.9   896.2  323.2   554.6  1403.2   177.4  556.65
--------------------------------------------------------------------------------------------------
      Veh. Type:   GasBUS   URBAN   SCHOOL
                   ------  ------  ------
       VMT Mix:  0.0003  0.0009  0.0016
Fuel Economy (mpg):    6.4     4.3     6.2
--------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
  Composite VOC :   0.577   0.389   0.598
  Composite CO  :   9.97    3.175   1.762
  Composite NOX :   2.824  10.382   7.347
  Composite CO2 : 1375.3  2346.0  1646.5
--------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 30 mph - Summer
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV
```

Table I-4 MOBILE6.2.03 Output Files

```
* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
        The user supplied arterial average speed of 30.0
        will be used for all hours of the day.  100% of VMT
        has been assigned to the arterial/collector roadway
        type for all hours of the day and all vehicle types.
 M 48 Warning:
         there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
             Calendar Year:  2009
                    Month:  July
                  Altitude:  Low
       Minimum Temperature:  70.4 (F)
       Maximum Temperature:  93.7 (F)
         Absolute Humidity:  75. grains/lb
       Fuel Sulfur Content:  30. ppm

       Exhaust I/M Program:  Yes
          Evap I/M Program:  Yes
              ATP Program:  No
          Reformulated Gas:  Yes

    Vehicle Type:   LDGV  LDGT12  LDGT34   LDGT    HDGV    LDDV    LDDT    HDDV     MC  All Veh
          GVWR:           <6000   >6000   (All)
                   ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823  0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
Fuel Economy (mpg):   24.1    18.6    14.2    17.1     9.9    31.5    18.3     7.3    50.0    16.4
--------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
  Composite VOC :   0.499   0.364   0.442   0.386   0.507   0.411   0.330   0.408    3.64   0.443
  Composite CO  :    5.06    4.72    5.44    4.92    5.87   1.437   0.611   1.695   14.61   4.755
  Composite NOX :   0.428   0.448   0.694   0.517   1.865   0.646   0.458   6.288    1.17   1.037
  Composite CO2 :   368.2   478.0   622.9   518.9   896.2   323.2   554.6  1403.2   177.4  556.65
--------------------------------------------------------------------------------------------------
      Veh. Type:   GasBUS   URBAN   SCHOOL
                   ------  ------  ------
        VMT Mix:   0.0003  0.0009  0.0016
Fuel Economy (mpg):   6.4     4.3     6.2
--------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
  Composite VOC :   0.500   0.334   0.513
```

Table I-4 MOBILE6.2.03 Output Files

```
   Composite CO  :   8.27    2.626   1.458
   Composite NOX :   2.943   9.909   7.012
   Composite CO2 : 1375.3   2346.0  1646.5
------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 35 mph - Summer
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
       The user supplied arterial average speed of 35.0
       will be used for all hours of the day.  100% of VMT
       has been assigned to the arterial/collector roadway
       type for all hours of the day and all vehicle types.
 M 48 Warning:
        there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
             Calendar Year:  2009
                    Month:  July
                 Altitude:  Low
        Minimum Temperature:  70.4 (F)
        Maximum Temperature:  93.7 (F)
         Absolute Humidity:  75. grains/lb
        Fuel Sulfur Content:  30. ppm

         Exhaust I/M Program:  Yes
            Evap I/M Program:  Yes
```

Table I-4 MOBILE6.2.03 Output Files

```
              ATP Program:  No
          Reformulated Gas:  Yes

     Vehicle Type:   LDGV   LDGT12  LDGT34    LDGT     HDGV     LDDV     LDDT     HDDV      MC   All Veh
          GVWR:             <6000   >6000    (All)
                     ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
   VMT Distribution:  0.3386  0.3823  0.1504           0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
 Fuel Economy (mpg):    24.1    18.6    14.2    17.1     9.9    31.5    18.3     7.3    50.0    16.4
 --------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
   Composite VOC :    0.478   0.350   0.423   0.371   0.457   0.383   0.303   0.358    3.48   0.421
   Composite CO  :    5.15    4.81    5.55    5.02    5.14   1.340   0.564   1.468   12.91   4.786
   Composite NOX :    0.413   0.438   0.681   0.507   1.940   0.640   0.454   6.234    1.22   1.024
   Composite CO2 :   368.2   478.0   622.9   518.9   896.2   323.2   554.6  1403.2   177.4  556.65
 --------------------------------------------------------------------------------------------------------
        Veh. Type:   GasBUS    URBAN   SCHOOL
                     ------   ------   ------
          VMT Mix:   0.0003   0.0009   0.0016
 Fuel Economy (mpg):     6.4      4.3      6.2
 --------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
   Composite VOC :    0.448    0.293    0.449
   Composite CO  :    7.24     2.273    1.262
   Composite NOX :    3.062    9.814    6.945
   Composite CO2 :  1375.3   2346.0   1646.5
 --------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 50 mph - Summer
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

Table I-4 MOBILE6.2.03 Output Files

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
 M583 Warning:
       The user supplied arterial average speed of 50.0
       will be used for all hours of the day.  100% of VMT
       has been assigned to the arterial/collector roadway
       type for all hours of the day and all vehicle types.
 M 48 Warning:
        there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
            Calendar Year:  2009
                   Month:  July
                Altitude:  Low
       Minimum Temperature:  70.4 (F)
       Maximum Temperature:  93.7 (F)
        Absolute Humidity:  75. grains/lb
       Fuel Sulfur Content:  30. ppm

       Exhaust I/M Program:  Yes
          Evap I/M Program:  Yes
              ATP Program:  No
         Reformulated Gas:  Yes

    Vehicle Type:   LDGV  LDGT12  LDGT34   LDGT   HDGV   LDDV   LDDT   HDDV    MC  All Veh
          GVWR:           <6000   >6000   (All)
                   ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
  VMT Distribution:  0.3386  0.3823  0.1504        0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
 Fuel Economy (mpg):    24.1    18.6    14.2    17.1     9.9    31.5    18.3     7.3    50.0    16.4
--------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
   Composite VOC :   0.444   0.332   0.397   0.350   0.379   0.335   0.259   0.275    3.28   0.388
   Composite CO  :    6.12    5.69    6.49    5.92    4.81   1.247   0.519   1.251   10.68   5.552
   Composite NOX :   0.432   0.466   0.713   0.535   2.166   0.762   0.541   7.419    1.34   1.157
   Composite CO2 :   368.2   478.0   622.9   518.9   896.2   323.2   554.6  1403.2   177.4  556.65
--------------------------------------------------------------------------------------------------
      Veh. Type:   GasBUS   URBAN   SCHOOL
                   ------  ------  ------
        VMT Mix:   0.0003  0.0009  0.0016
 Fuel Economy (mpg):   6.4     4.3     6.2
--------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
   Composite VOC :   0.369   0.225   0.345
   Composite CO  :    6.77   1.938   1.076
   Composite NOX :   3.419  11.897   8.421
```

Table I-4 MOBILE6.2.03 Output Files

```
 Composite CO2 :  1375.3   2346.0   1646.5
 ------------------------------------------------------------------------------------------------------------------

 ******************************************************************************
 * MOBILE6.2.03 (24-Sep-2003)                                *
 * Input file: MA09_ALL.INP (file 1, run 1).                 *
 ******************************************************************************

 * # # # # # # # # # # # # # # # # # # # # # # # # #
 * 2009 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr)
 * File 1, Run 1, Scenario 1.
 * # # # # # # # # # # # # # # # # # # # # # # # # #

                 Calendar Year:  2009
                         Month:  July
      Gasoline Fuel Sulfur Content:   30. ppm
        Diesel Fuel Sulfur Content:   15. ppm
            Particle Size Cutoff: 10.00 Microns
               Reformulated Gas:  Yes

   Vehicle Type:    LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV     MC   All Veh
          GVWR:             <6000    >6000    (All)
                   ------  ------   ------   ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823   0.1504            0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
 ------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
             GASPM:  0.0039  0.0039  0.0038  0.0039  0.0362  ------  ------  ------  0.0205  0.0048
           ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
           OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
               SO4:  0.0005  0.0006  0.0006  0.0006  0.0012  0.0002  0.0003  0.0009  0.0002  0.0006
  Total Exhaust PM:  0.0044  0.0045  0.0045  0.0045  0.0374  0.1340  0.0563  0.1707  0.0207  0.0202
             Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
              Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
          Total PM:  0.0250  0.0250  0.0250  0.0250  0.0585  0.1545  0.0769  0.2080  0.0372  0.0422
               SO2:  0.0067  0.0087  0.0115  0.0095  0.0164  0.0030  0.0052  0.0131  0.0033  0.0091
               NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
 ------------------------------------------------------------------------------------------------------------------
      Veh. Type:   GasBUS   URBAN   SCHOOL
                   ------   ------  ------
        VMT Mix:   0.0003   0.0009  0.0016
 ------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:  0.0000  ------  ------
             GASPM:  0.0394  ------  ------
           ECARBON:  ------  0.1387  0.0820
           OCARBON:  ------  0.1090  0.0644
               SO4:  0.0012  0.0015  0.0011
  Total Exhaust PM:  0.0406  0.2492  0.1475
             Brake:  0.0125  0.0125  0.0125
              Tire:  0.0120  0.0120  0.0120
          Total PM:  0.0652  0.2738  0.1720
               SO2:  0.0254  0.0219  0.0153
               NH3:  0.0451  0.0270  0.0270
```

Table I-4 MOBILE6.2.03 Output Files

```
----------------------------------------------------------------------------------------------------

* #########################
* 2009 15 mph - Summer
* File 1, Run 1, Scenario 2.
* #########################

                 Calendar Year:  2009
                         Month:  July
      Gasoline Fuel Sulfur Content:   30. ppm
        Diesel Fuel Sulfur Content:   15. ppm
             Particle Size Cutoff: 10.00 Microns
               Reformulated Gas:  Yes

   Vehicle Type:   LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV     MC   All Veh
         GVWR:              <6000    >6000    (All)
                 ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823  0.1504           0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
----------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
         Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
        GASPM:  0.0039  0.0039  0.0038  0.0039  0.0362  ------  ------  ------  0.0205  0.0048
      ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
      OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
          SO4:  0.0005  0.0006  0.0006  0.0006  0.0012  0.0002  0.0003  0.0009  0.0002  0.0006
 Total Exhaust PM:  0.0044  0.0045  0.0045  0.0045  0.0374  0.1340  0.0563  0.1707  0.0207  0.0202
        Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
         Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
     Total PM:  0.0250  0.0250  0.0250  0.0250  0.0585  0.1545  0.0769  0.2080  0.0372  0.0422
          SO2:  0.0067  0.0087  0.0115  0.0095  0.0164  0.0030  0.0052  0.0131  0.0033  0.0091
          NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
----------------------------------------------------------------------------------------------------
     Veh. Type:  GasBUS   URBAN   SCHOOL
                 ------  ------  ------
       VMT Mix:  0.0003  0.0009  0.0016
----------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
         Lead:  0.0000  ------  ------
        GASPM:  0.0394  ------  ------
      ECARBON:  ------  0.1387  0.0820
      OCARBON:  ------  0.1090  0.0644
          SO4:  0.0012  0.0015  0.0011
 Total Exhaust PM:  0.0406  0.2492  0.1475
        Brake:  0.0125  0.0125  0.0125
         Tire:  0.0120  0.0120  0.0120
     Total PM:  0.0652  0.2738  0.1720
          SO2:  0.0254  0.0219  0.0153
          NH3:  0.0451  0.0270  0.0270
----------------------------------------------------------------------------------------------------

* #########################
* 2009 20 mph - Summer
* File 1, Run 1, Scenario 3.
* #########################
```

Table I-4 MOBILE6.2.03 Output Files

```
                Calendar Year: 2009
                       Month: July
        Gasoline Fuel Sulfur Content:  30. ppm
          Diesel Fuel Sulfur Content:  15. ppm
             Particle Size Cutoff: 10.00 Microns
                 Reformulated Gas: Yes

  Vehicle Type:    LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV     MC  All Veh
      GVWR:               <6000    >6000    (All)
                  ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823  0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
---------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
        Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
       GASPM:  0.0039  0.0039  0.0039  0.0039  0.0361  ------  ------  ------  0.0205  0.0048
     ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
     OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
         SO4:  0.0005  0.0006  0.0006  0.0006  0.0012  0.0002  0.0003  0.0009  0.0002  0.0006
 Total Exhaust PM:  0.0044  0.0045  0.0045  0.0045  0.0374  0.1340  0.0563  0.1707  0.0207  0.0202
       Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
        Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
    Total PM:  0.0250  0.0250  0.0250  0.0250  0.0585  0.1545  0.0769  0.2080  0.0372  0.0422
         SO2:  0.0067  0.0087  0.0115  0.0095  0.0164  0.0030  0.0052  0.0131  0.0033  0.0091
         NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
---------------------------------------------------------------------------------------------------
     Veh. Type:  GasBUS   URBAN   SCHOOL
                 ------  ------  ------
      VMT Mix:   0.0003  0.0009  0.0016
---------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
        Lead:  0.0000  ------  ------
       GASPM:  0.0394  ------  ------
     ECARBON:  ------  0.1387  0.0820
     OCARBON:  ------  0.1090  0.0644
         SO4:  0.0012  0.0015  0.0011
 Total Exhaust PM:  0.0406  0.2492  0.1475
       Brake:  0.0125  0.0125  0.0125
        Tire:  0.0120  0.0120  0.0120
    Total PM:  0.0652  0.2738  0.1720
         SO2:  0.0254  0.0219  0.0153
         NH3:  0.0451  0.0270  0.0270
---------------------------------------------------------------------------------------------------

* #########################
* 2009 25 mph - Summer
* File 1, Run 1, Scenario 4.
* #########################

                Calendar Year: 2009
                       Month: July
        Gasoline Fuel Sulfur Content:  30. ppm
          Diesel Fuel Sulfur Content:  15. ppm
             Particle Size Cutoff: 10.00 Microns
```

Table I-4 MOBILE6.2.03 Output Files

```
                 Reformulated Gas:  Yes

    Vehicle Type:    LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV      MC   All Veh
         GVWR:                <6000    >6000    (All)
                     ------   ------   ------   ------   ------   ------   ------   ------   ------   ------
  VMT Distribution:  0.3386   0.3823   0.1504            0.0368   0.0004   0.0014   0.0862   0.0039   1.0000
---------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
            Lead:  0.0000   0.0000   0.0000   0.0000   0.0000   ------   ------   ------   0.0000   0.0000
           GASPM:  0.0040   0.0039   0.0039   0.0039   0.0360   ------   ------   ------   0.0205   0.0048
         ECARBON:  ------   ------   ------   ------   ------   0.1044   0.0230   0.1133   ------   0.0098
         OCARBON:  ------   ------   ------   ------   ------   0.0294   0.0331   0.0565   ------   0.0049
             SO4:  0.0004   0.0005   0.0005   0.0005   0.0014   0.0002   0.0003   0.0009   0.0001   0.0006
 Total Exhaust PM:  0.0044   0.0044   0.0044   0.0044   0.0375   0.1340   0.0563   0.1707   0.0206   0.0202
           Brake:  0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125
            Tire:  0.0080   0.0080   0.0080   0.0080   0.0085   0.0080   0.0080   0.0248   0.0040   0.0094
        Total PM:  0.0249   0.0250   0.0250   0.0250   0.0585   0.1545   0.0769   0.2080   0.0372   0.0422
             SO2:  0.0067   0.0088   0.0115   0.0095   0.0163   0.0030   0.0052   0.0131   0.0033   0.0091
             NH3:  0.1014   0.1015   0.1016   0.1016   0.0451   0.0068   0.0068   0.0270   0.0113   0.0925
---------------------------------------------------------------------------------------------------------
      Veh. Type:  GasBUS   URBAN   SCHOOL
                  ------   ------   ------
        VMT Mix:  0.0003   0.0009   0.0016
---------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
            Lead:  0.0000   ------   ------
           GASPM:  0.0393   ------   ------
         ECARBON:  ------   0.1387   0.0820
         OCARBON:  ------   0.1090   0.0644
             SO4:  0.0014   0.0015   0.0011
 Total Exhaust PM:  0.0407   0.2492   0.1475
           Brake:  0.0125   0.0125   0.0125
            Tire:  0.0120   0.0120   0.0120
        Total PM:  0.0653   0.2738   0.1720
             SO2:  0.0253   0.0219   0.0153
             NH3:  0.0451   0.0270   0.0270
---------------------------------------------------------------------------------------------------------

* #########################
* 2009 30 mph - Summer
* File 1, Run 1, Scenario 5.
* #########################

                Calendar Year:  2009
                        Month:  July
   Gasoline Fuel Sulfur Content:  30. ppm
     Diesel Fuel Sulfur Content:  15. ppm
          Particle Size Cutoff: 10.00 Microns
              Reformulated Gas:  Yes

    Vehicle Type:    LDGV   LDGT12   LDGT34    LDGT    HDGV    LDDV    LDDT    HDDV      MC   All Veh
         GVWR:                <6000    >6000    (All)
                     ------   ------   ------   ------   ------   ------   ------   ------   ------   ------
  VMT Distribution:  0.3386   0.3823   0.1504            0.0368   0.0004   0.0014   0.0862   0.0039   1.0000
```

Table I-4 MOBILE6.2.03 Output Files

```
-------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
         Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
        GASPM:  0.0040  0.0039  0.0039  0.0039  0.0359  ------  ------  ------  0.0205  0.0049
      ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
      OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
          SO4:  0.0003  0.0005  0.0005  0.0005  0.0016  0.0002  0.0003  0.0009  0.0001  0.0005
Total Exhaust PM:  0.0044  0.0044  0.0044  0.0044  0.0376  0.1340  0.0563  0.1707  0.0206  0.0202
        Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
         Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
     Total PM:  0.0249  0.0250  0.0250  0.0250  0.0586  0.1545  0.0769  0.2080  0.0371  0.0421
          SO2:  0.0067  0.0088  0.0115  0.0095  0.0163  0.0030  0.0052  0.0131  0.0033  0.0091
          NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
-------------------------------------------------------------------------------------------------------

     Veh. Type:   GasBUS   URBAN   SCHOOL
                  ------   ------  ------
      VMT Mix:    0.0003   0.0009  0.0016
-------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
         Lead:  0.0000  ------  ------
        GASPM:  0.0393  ------  ------
      ECARBON:  ------  0.1387  0.0820
      OCARBON:  ------  0.1090  0.0644
          SO4:  0.0015  0.0015  0.0011
Total Exhaust PM:  0.0408  0.2492  0.1475
        Brake:  0.0125  0.0125  0.0125
         Tire:  0.0120  0.0120  0.0120
     Total PM:  0.0653  0.2738  0.1720
          SO2:  0.0253  0.0219  0.0153
          NH3:  0.0451  0.0270  0.0270
-------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 35 mph - Summer
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                      Calendar Year:  2009
                              Month:  July
       Gasoline Fuel Sulfur Content:  30. ppm
         Diesel Fuel Sulfur Content:  15. ppm
              Particle Size Cutoff: 10.00 Microns
                  Reformulated Gas:  Yes

     Vehicle Type:   LDGV   LDGT12   LDGT34   LDGT    HDGV    LDDV    LDDT    HDDV     MC   All Veh
             GVWR:           <6000    >6000   (All)
                    ------  ------   ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823   0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
-------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
         Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
        GASPM:  0.0041  0.0040  0.0040  0.0040  0.0358  ------  ------  ------  0.0205  0.0049
      ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
      OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
```

Table I-4 MOBILE6.2.03 Output Files

```
            SO4:  0.0002  0.0004  0.0004  0.0004  0.0018  0.0002  0.0003  0.0009  0.0001  0.0005
 Total Exhaust PM:  0.0043  0.0044  0.0044  0.0044  0.0377  0.1340  0.0563  0.1707  0.0206  0.0201
          Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
           Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
       Total PM:  0.0249  0.0250  0.0250  0.0250  0.0587  0.1545  0.0769  0.2080  0.0371  0.0421
            SO2:  0.0068  0.0088  0.0115  0.0096  0.0162  0.0030  0.0052  0.0131  0.0033  0.0091
            NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
----------------------------------------------------------------------------------------------------
      Veh. Type:  GasBUS   URBAN   SCHOOL
                  ------  ------  ------
        VMT Mix:  0.0003  0.0009  0.0016
----------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
           Lead:  0.0000  ------  ------
          GASPM:  0.0392  ------  ------
        ECARBON:  ------  0.1387  0.0820
        OCARBON:  ------  0.1090  0.0644
            SO4:  0.0017  0.0015  0.0011
 Total Exhaust PM:  0.0409  0.2492  0.1475
          Brake:  0.0125  0.0125  0.0125
           Tire:  0.0120  0.0120  0.0120
       Total PM:  0.0654  0.2738  0.1720
            SO2:  0.0252  0.0219  0.0153
            NH3:  0.0451  0.0270  0.0270
----------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2009 50 mph - Summer
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                 Calendar Year:  2009
                         Month:  July
  Gasoline Fuel Sulfur Content:  30. ppm
    Diesel Fuel Sulfur Content:  15. ppm
          Particle Size Cutoff: 10.00 Microns
             Reformulated Gas:  Yes

   Vehicle Type:   LDGV  LDGT12  LDGT34   LDGT    HDGV    LDDV    LDDT    HDDV     MC  All Veh
         GVWR:          <6000   >6000   (All)
                 ------  ------  ------  ------  ------  ------  ------  ------  ------  ------
 VMT Distribution:  0.3386  0.3823  0.1504          0.0368  0.0004  0.0014  0.0862  0.0039  1.0000
----------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
           Lead:  0.0000  0.0000  0.0000  0.0000  0.0000  ------  ------  ------  0.0000  0.0000
          GASPM:  0.0041  0.0040  0.0040  0.0040  0.0358  ------  ------  ------  0.0205  0.0049
        ECARBON:  ------  ------  ------  ------  ------  0.1044  0.0230  0.1133  ------  0.0098
        OCARBON:  ------  ------  ------  ------  ------  0.0294  0.0331  0.0565  ------  0.0049
            SO4:  0.0002  0.0004  0.0004  0.0004  0.0018  0.0002  0.0003  0.0009  0.0001  0.0005
 Total Exhaust PM:  0.0043  0.0044  0.0044  0.0044  0.0377  0.1340  0.0563  0.1707  0.0206  0.0201
          Brake:  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125  0.0125
           Tire:  0.0080  0.0080  0.0080  0.0080  0.0085  0.0080  0.0080  0.0248  0.0040  0.0094
       Total PM:  0.0249  0.0250  0.0250  0.0250  0.0587  0.1545  0.0769  0.2080  0.0371  0.0421
            SO2:  0.0068  0.0088  0.0115  0.0096  0.0162  0.0030  0.0052  0.0131  0.0033  0.0091
```

Table I-4 MOBILE6.2.03 Output Files

```
        NH3:  0.1014  0.1015  0.1016  0.1016  0.0451  0.0068  0.0068  0.0270  0.0113  0.0925
---------------------------------------------------------------------------------------------
   Veh. Type:  GasBUS  URBAN  SCHOOL
               ------  ------  ------
    VMT Mix:  0.0003  0.0009  0.0016
---------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
        Lead:  0.0000  ------  ------
       GASPM:  0.0392  ------  ------
     ECARBON:  ------  0.1387  0.0820
     OCARBON:  ------  0.1090  0.0644
         SO4:  0.0017  0.0015  0.0011
 Total Exhaust PM:  0.0409  0.2492  0.1475
       Brake:  0.0125  0.0125  0.0125
        Tire:  0.0120  0.0120  0.0120
    Total PM:  0.0654  0.2738  0.1720
         SO2:  0.0252  0.0219  0.0153
         NH3:  0.0451  0.0270  0.0270
---------------------------------------------------------------------------------------------
```

Fuel Storage and Handling

As in previous years, volatile organic compounds (VOC) emissions from fuel storage and handling were calculated using methods based on EPA's AP-42[2] document. Calculations account for evaporative emissions from breathing losses, working losses, and spillage from above-ground storage tanks, underground storage tanks, and aircraft refueling. In 2003, additional information became available on the fire training fuel, Tek-Flame®. Emissions of VOCs from this fuel were estimated by EDMS. Table I-5 presents Logan Airport's fuel throughput by category.

Table I-5 Fuel Throughput by Fuel Category (gallons)

Fuel Category	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jet Fuel	354,095,516	441,901,932	416,748,819	358,190,362	319,439,910	373,996,141	368,645,392	364,450,864	367,585,187	345,631,788	327,358,619
Fire Training Fuel[1]	NA	NA	NA	NA	13,719	12,227	8,105	5,000	8,631	5,971	3,510
Aviation Gas	99,726	90,922	60,691	35,111	32,515	34,717	52,487	35,098	29,067	25,037	18,238
Auto Gas	7,200,000	7,569,206	6,181,472	5,754,740	5,436,322	5,803,442	5,903,424	6,028,931	6,022,237	5,693,178	5,736,724
Diesel	768,106	839,751	1,239,904	1,067,847	1,030,185	1,078,665	1,567,688	1,164,493	1,141,335	1,071,707	1,121,241
Heating Oil No.2	480,733	494,500	582,283	340,492	370,903	381,852	367,899	259,768	423,181	303,143	409,049
Heating Oil No.6	1,600,893	1,555,527	1,641,693	1,079,283	1,122,975	2,940,752	3,098,126	1,396,529	1,073,260	16,385	368,690

Source: Massport, 2010.
1 Tek-Flame® Fuel was not used until 2003. Jet A Fuel was used prior to 2003.
NA Not available.

2 Compilation of Air Pollutant Emission Factors, AP-42, Office of Air Quality Planning and Standards, EPA, Fifth Edition,1995.

Stationary Sources

Stationary sources include the Central Heating and Cooling Plant, emergency generators, snow melters, and boilers. Emission factors from EPA's AP-42 or NO_x Reasonably Available Control Technology (RACT) compliance testing were combined with the actual 2009 fuel throughput of the stationary sources to obtain emissions of VOCs, NO_X, CO, and $PM_{10}/PM_{2.5}$.

Title V of the 1990 CAA Amendments requires facilities with air emissions to document their emissions and obtain a single permit combining all sources. The permitting program ensures that all emission sources are accounted for, the proper permits have been received, and permit conditions are being followed. A Title V Air Operating Permit covers all of the stationary sources at Logan Airport including boilers, emergency generators, snow melters, cooling towers, paint booths, deicing facilities, and storage tanks. Table I-6 presents Logan Airport's stationary source fuel throughput by fuel category.

Table I-6 Stationary Source Fuel Throughput by Fuel Category (gallons)

Fuel Category	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas (ft^3)	183,943,000	283,720,049	199,500,000	268,359,282	201,714,114	62,610,000	92,460,000	112,390,000	338,430,000	458,680,000	430,810,000
Heating Oil No. 2	480,733	494,500	582,283	340,492	370,903	381,852	367,899	259,768	423,181	303,143	409,050
Heating Oil No. 6	1,600,893	1,555,527	1,641,693	1,079,283	1,122,975	2,940,752	3,098,126	1,396,529	1,073,260	16,385	368,690
Diesel Fuel[1]	57,441	NA	NA	NA	NA	67,198	77,848	77,848	258,606	146,718	145,778
Fire Training Fuel[2]	23,000	NA	NA	NA	13,719	12,227	8,105	5,000	8,631	5,971	3,510

Source: Massport, 2010.
NA Not available.
1 Diesel fuel was from the stationary snow melter usage. Starting in 2007, portable snow melter usage was also included.
2 Fire Training Fuel used in 1999 was Jet A Fuel while in 2003 through 2009 it was Tek-Flame®.

1993 Through 2003 Emissions Inventories

Tables I-7 through I-9 contain the 1993 through 2003 Emissions Inventory summary tables for Logan Airport.

Table I-7 Estimated VOC Emissions (in kg/day) at Logan Airport[1]

	1993	1994	1995	1996	1997	1998	1999[2]	2000	2001	2002	2003
Aircraft/GSE Model	Logan Dispersion Modeling System (LDMS)					EDMS v3.22	EDMS v4.21	EDMS v4.03		EDMS v4.11	
Motor Vehicle Model	MOBILE5a					MOB5a_h	MOB6.2.03	MOBILE 6.0			MOB6.2.01
Aircraft Sources											
Air carriers	1,958	1,554	1,407	1,390	1,227	736	653	514	374	248	208
Commuter aircraft	943	543	531	622	498	154	196	140	113	75	95
Cargo aircraft	89	244	236	214	207	43	318	207	149	127	94
General aviation	51	48	36	24	27	13	141	42	43	52	61
Total aircraft sources	3,041	2,389	2,210	2,250	1,959	946	1,308	903	679	502	458
Ground Service Equipment[3]	636	533	521	497	530	145	243	153	143	247[4]	227
Motor Vehicles											
Ted Williams Tunnel through-traffic	NA	NA	NA	NA	NA	NA	15	12	10	9	0[5]
Parking/curbside	173	148	127	102	102	118	101	89	77	51	45
On-airport vehicles[6]	238	215	179	223	205	258	256	206	170	152	135
Total motor vehicle sources	411	363	306	325	307	376	372	307	257	212	180
Other Sources											
Fuel storage/handling	408	434	318	356	381	372	352	412	372	329	297
Miscellaneous sources[7]	5	5	5	6	6	2	16	2	2	2	3
Total other sources	413	439	323	362	387	374	368	414	374	331	300
Total Airport Sources	4,501	3,724	3,360	3,434	3,183	1,841	2,291	1,777	1,453	1,292	1,165

kg/day kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).
NA Not available.
MOB MOBILE model for motor vehicle emissions (MOB5a_h=MOBILE5a_h, MOB6.2=MOBILE6.2 version .01 or version .03)
1 The emissions inventory for 1990 is shown in the 2005 EDR. Emission inventories for 1991 and 1992 were not prepared.
2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the 2004 ESPR Air Quality Analysis.
3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. APU emissions are also included.
4 Updates to the EDMS resulted in an increase of GSE NOx emissions between 2001 and 2002 as the result of new emission factors from the NONROAD emission factor database.
5 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.
6 1999 through 2003 emissions inventory include reductions attributable to CNG shuttle buses.
7 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire Training emissions were included in 1999 and 2003. Diesel snow melter usage was added in 1999.

Table I-8 Estimated NO_x Emissions (in kg/day) at Logan Airport[1]

	1993	1994	1995	1996	1997	1998	1999[2]	2000	2001	2002	2003
Aircraft/GSE Model	Logan Dispersion Modeling System (LDMS)					EDMS v3.22	EDMS v4.21	EDMS v4.03		EDMS v4.11	
Motor Vehicle Model	MOBILE5a					MOB5a_h	MOB6.2.03	MOBILE 6.0			MOB6.2.01
Aircraft Sources											
Air carriers	4,271	4,317	3,861	3,781	4,150	4,471	4,183	4,202	3,707	2,721	2,479
Commuter aircraft	202	158	192	137	159	203	166	125	233	208	185
Cargo aircraft	213	257	332	363	262	254	286	284	267	246	213
General aviation	13	13	17	18	21	5	12	49	34	38	45
Total aircraft sources	4,699	4,745	4,402	4,299	4,592	4,933	4,647	4,660	4,241	3,213	2,922
Ground Service Equipment[3]	722	617	607	588	622	317	444	333	305	322[4]	291
Motor Vehicles											
Ted Williams Tunnel through-traffic	NA	NA	NA	NA	NA	NA	28	26	22	20	0[5]
Parking/curbside	25	24	24	24	24	37	39	52	46	32	28
On-airport vehicles[6]	240	239	229	257	244	372	449	425	369	341	302
Total motor vehicle sources	265	263	253	281	268	409	516	503	437	393	330
Other Sources											
Fuel storage/handling[7]	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous sources[8]	278	330	320	275	244	284	165	211	185	175	151
Total other sources	278	330	320	275	244	284	165	211	185	175	151
Total Airport Sources	5,964	5,955	5,582	5,443	5,726	5,943	5,772	5,707	5,168	4,103	3,694

kg/day kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).
NA Not available.
MOB MOBILE model for motor vehicle emissions (MOB5a_h=MOBILE5a_h, MOB6.2=MOBILE6.2 version .01 or version .03)
1 The emissions inventory for 1990 is shown in the 2005 EDR. Emission inventories for 1991 and 1992 were not prepared.
2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the 2004 ESPR Air Quality Analysis.
3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. APU emissions are also included.
4 Updates to the EDMS resulted in an increase of GSE NOx emissions between 2001 and 2002 as the result of new emission factors from the NONROAD emission factor database.
5 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.
6 1999 through 2003 emissions inventory include reductions attributable to CNG shuttle buses.
7 Fuel storage and handling facilities are not sources of NOx emissions.
8 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire Training emissions were included in 1999 and 2003. Diesel snow melter usage was added in 1999.

Table I-9 Estimated CO Emissions (in kg/day) at Logan Airport[1]											
	1993	1994	1995	1996	1997	1998	1999[2]	2000	2001	2002	2003
Aircraft/GSE Model	Logan Dispersion Modeling System (LDMS)					EDMS 3.22	EDMS v4.21	EDMS v4.03		EDMS v4.11	
Motor Vehicle Model	MOBILE5a					MOB5a_h	MOB6.2.03	MOBILE 6.0			MOB6.2.01
Aircraft Sources											
Air carriers	5,663	4,660	4,691	4,812	4,698	3,079	3,754	2,994	2,475	2,156	2,128
Commuter aircraft	1,309	927	934	859	770	482	1,404	1,188	1,072	783	846
Cargo aircraft	344	572	598	580	514	218	503	400	323	285	209
General aviation	353	356	339	549	654	269	940	295	407	256	276
Total aircraft sources	7,669	6,515	6,562	6,800	6,636	4,048	6,601	4,877	4,277	3,480	3,459
Ground Service Equipment[3]	7,482	6,187	6,029	5,740	6,098	5,113	4,532	5,335	5,193	5,170	4,758
Motor Vehicles											
Ted Williams Tunnel through-traffic	NA	NA	NA	NA	NA	NA	151	133	121	112	0[4]
Parking/curbside	952	820	650	644	586	772	437	495	440	295	253
On-airport vehicles[5]	1,575	1,451	1,087	1,514	1,283	1,883	2,547	2,245	2,001	1,872	1,685
Total motor vehicle sources	2,527	2,271	1,737	2,158	1,869	2,655	3,135	2,873	2,562	2,279	1,938
Other Sources											
Fuel storage/handling[6]	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous sources[7]	26	30	29	39	37	37	168	27	24	23	22
Total other sources	26	30	29	39	37	37	168	27	24	23	22
Total Airport Sources	17,704	15,003	14,357	14,737	14,640	11,853	14,436	13,112	12,056	10,952	10,177

kg/day kilograms per day. 1 kg/day is approximately equivalent to 0.40234 tons per year (tpy).
NA Not available.
MOB MOBILE model for motor vehicle emissions (MOB5a_h=MOBILE5a_h, MOB6.2=MOBILE6.2 version .01 or version .03)
1 The emissions inventory for 1990 is shown in the 2005 EDR. Emission inventories for 1991 and 1992 were not prepared.
2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the 2004 ESPR Air Quality Analysis.
3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. APU emissions are also included.
4 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.
5 1999 through 2003 emission inventory include reductions attributable to CNG shuttle buses.
6 Fuel storage and handling facilities are not sources of CO emissions.
7 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire Training emissions were included in 1999 and 2003. Diesel snow melter usage was added in 1999.

Greenhouse Gas Emissions Inventory

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) has published the *MEPA Greenhouse Gas (GHG) Emissions Policy and Protocol*.[3] These guidelines require that certain projects undergoing review under the Massachusetts Environmental Policy Act (MEPA) quantify the GHG emissions generated by proposed projects, and identify measures to avoid, minimize, or mitigate such emissions.[4] Even though the *2009 EDR* does not assess any proposed projects and is therefore not subject to the GHG policy, Massport has voluntarily prepared an emission inventory of GHG emissions directly and indirectly associated with Logan Airport.

In April 2009, the Transportation Research Board (TRB) Airport Cooperative Research Program (ACRP); published the *Guidebook on Preparing Airport Greenhouse Gas Emission Inventories (ACRP Report 11)*, which provides recommended instructions to airport operators on how to prepare an airport-specific GHG emissions inventory.[5] The 2009 GHG emissions estimates include aircraft (within the ground taxi/delay and up to 3,000 feet), ground support equipment (GSE), auxiliary power units (APU), motor vehicles, a variety of stationary sources, and electricity usage. Aircraft cruise emissions over the 3,000-foot level were not included. This work was accomplished following the EEA guidelines and uses widely-accepted emission factors that are considered appropriate for this application, including ISO (International Organization for Standardization) New England electricity-based values.

Methodology

Airport GHG emissions are calculated in much the same way criteria pollutants,[6] through the use of input data such as activity levels or material throughput rates (i.e., fuel usage, vehicle miles traveled (VMT), electrical consumption) that are applied to appropriate emission factors (i.e., in units of GHG emissions per gallon of fuel).

In this case, the input data were either based on Massport records, or data and information derived from the latest version of the Federal Aviation Administration (FAA) Emissions and Dispersion Modeling System (EDMS v5.1.2). Table I-10 summarizes these data and information used in the 2009 GHG inventory.

Massport will update the GHG Emissions Inventory for Logan Airport annually.

3 Revised *MEPA Greenhouse Gas Emissions Policy and Protocol*, Massachusetts Executive Office of Energy and Environmental Affairs, effective May 10, 2010.

4 These GHG are comprised primarily of carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), and three groups of fluorinated gases (i.e., sulfur hexafluoride [SF_6], hydrofluorocarbons [HFCs], and perfluorocarbons [PFCs]). GHG emission sources associated with airports are generally limited to CO_2, CH_4, and N_2O.

5 Transportation Research Board, Airport Cooperative Research Panel, ACRP Report 11, Project 02-06, *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories* (in production). See http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf for the full report.

6 Criteria pollutants are pollutants for which there are National Ambient Air Quality Standards (i.e., carbon monoxide, sulfur dioxide, nitrogen dioxide, etc.).

Table I-10 Logan GHG Inventory Input Data and Information[1]

Activity	Fuel Type	Usage	Units	Source
Aircraft Sources				
Aircraft Taxi	Jet A[2]	19,181,218	gallons	EDMS v5.1.2
	AvGas[3]	1,069	gallons	EDMS v5.1.2
Engine Startup	Jet A	212,433	gallons	EDMS v5.1.2
Aircraft Ground up to 3,000 feet	Jet A[2]	17,211,175	gallons	EDMS v5.1.2
	AvGas[3]	959	gallons	EDMS v5.1.2
Aircraft Support Equipment				
GSE	Diesel	754,934	gallons	Massport
	Gasoline	1,097,055	gallons	Massport
	Propane	3,532	gallons	EDMS v5.1.2
	CNG	952,840	ft^3	EDMS v5.1.2
APU	Jet A	770,031	gallons	EDMS v5.1.2
Motor Vehicles				
On-airport Vehicles	Composite[5]	56,736,157	VMT	Massport
On-airport Parking/Curbsides	Composite[5]	1,025,922	Idle hours	Massport
Massport Shuttle Bus	CNG	38,854,621	ft^3	Massport
	Diesel	5,015	gallons	Massport
Masspoort Fire Rescue	Diesel	6,005	gallons	Massport
Massport Fleet Vehicles (Honda Civic)	CNG	664,698	ft^3	Massport
Massport Fleet Vehicles (Fueled Onsite)	Gasoline	113,837	gallons	Massport
Massport Fleet Vehicles (Fueled Offsite)	Gasoline	67,552	gallons	Massport
Massport Fleet Vehicles (Fueled Onsite)	Diesel	109,448	gallons	Massport
Off-airport Vehicles (Public)	Composite[5]	132,487,191	VMT	Massport
Off-airport Vehicles (Airport Employees)	Composite[5]	3,485,016	VMT	Massport
Off-airport Vehicles (Tenant Employees)	Composite[5]	47,873,109	VMT	Massport
Stationary and Portable Sources				
Boilers and Space Heaters	No 2 Oil	409,049	gallons	Massport
	No 6 Oil	368,690	gallons	Massport
	Natural Gas	429.933	million ft^3	Massport
Generators, Snow melters, etc	ULSD	165,381	gallons	Massport
	CNG	2.60	million ft^3	Massport
Fire Training Facility	Tekflame	3,510	gallons	Massport
	AvGas	500	gallons	Massport
Electrical Consumption	-	176,487,589	kWh	Massport

Notes: APU – Auxiliary power units; CNG – compressed natural gas; GSE – ground support equipment; kWh – kilowatt hours; VMT – vehicle miles traveled; ULSD – ultra low sulfur diesel

1 Based on 2009 activity levels and conditions.
2 Jet A density of 6.84 pounds per gallon.
3 AvGas density of 6.0 pounds per gallon.
4 The LTO (landing and take-off operation) includes landing, taxi-in, taxi-out, take-off, and up to an altitude of 3,000 feet.
5 Composite means gasoline and diesel-fueled motor vehicle feel mix based on MOBILE62.

Emission factors were obtained from the U.S. Energy Information Administration, the International Panel on Climate Change (IPCC), and the EPA.[7,8,9] Table I-11 presents these emission factors for CO_2, N_2O, and CH_4.

Table I-11 GHG Emission Factors

Sources	Fuel	CO_2	N_2O	CH_4	Units
Aircraft[1]	Jet A	21.095	0.000188	0.00052	lb/gallon
	AvGas	18.355	0.000188	0.00052	lb/gallon
Ground Support Equipment/ Auxiliary Power Units[1]	Diesel	22.384	0.0002	0.00053	lb/gallon
	Gasoline	19.564	0.0002	0.00055	lb/gallon
	CNG	120.593	0.0002	0.00020	lb/1000 ft^3
	Propane	12.669	2.30E-07	0.000003	lb/gallon
	Jet A	21.095	0.000188	0.00052	lb/gallon
Motor Vehicles[2]	Composite	368	0.005	0.017	g/mile
	Composite	921	0.0125	0.190	g/hour
	CNG	120.593	0.0002	0.00020	lb/1000 ft^3
	Diesel	22.384	0.0002	0.000534	lb/gallon
	Gasoline	19.564	0.0002	0.00055	lb/gallon
Stationary and Portable[1]	No 2 Oil	22.384	0.000193	0.000534	lb/gallon
	No 6 Oil	26.033	0.000208	0.000225	lb/gallon
	Natural Gas	120.593	0.0002	0.0002	lb/1000 ft^3
	ULSD	22.384	0.000193	0.000534	lb/gallon
Fire Training Facility[1]	Tekflame[3]	12.669	2.30E-07	0.000003	lb/gallon
	AvGas	18.355	0.000188	0.00052	lb/gallon
Electrical Consumption[4]	-	0.906	0.0000146	0.0000207	lb/kW-hr

Notes: CH_4 – methane; CNG – compressed natural gas; CO_2 – carbon dioxide; g- grams; kWhr – kilowatt hour; lb – pound; N_2O – nitrous oxides.

1 Energy Information Administration, www.eia.doe.gov/oiaf/1605/coefficients.html.
2 Environmental Protection Agency, MOBILE6.2 Emissions Model and Volume 2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
3 As propane
4 ISO New England 2007 New England Marginal Emission Rate Analysis, July 2009 and Energy Information Administration, www.eia.doe.gov/oiaf/1605/ee-factors.html.

7 U.S. Energy Information Administration, Voluntary Reporting of Greenhouse Gases Program Fuel and Energy Source Codes and Emission Coefficients, www.eia.doe.gov/oiaf/1605/coefficients.html
8 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, 2006, www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
9 U.S. Environmental Protection Agency, MOBILE6.2 Emissions Model, www.epa.gov/otaq/m6.htm

Results

Table I-12 presents the results of the 2009 GHG emissions inventory for Logan Airport by emission source (i.e., aircraft, GSE, motor vehicles, and stationary sources) and compound (i.e., CO_2, N_20, and CH_4).

Table I-12 GHG Emissions (MMT CO_2 Eq)[1]

Activity	CO_2	N_2O	CH_4	Total
Aircraft Sources				
Aircraft Taxi	0.18	<0.01	<0.01	0.18
Engine Startup	<0.01	<0.01	<0.01	<0.01
Aircraft AGL to 3,000 feet	0.16	<0.01	<0.01	0.17
Aircraft Support Equipment				
GSE	0.02	<0.01	<0.01	0.02
APU	0.01	<0.01	<0.01	0.01
Motor Vehicles				
On-airport Vehicles	0.02	<0.01	<0.01	0.02
On-airport Parking/Curbsides	<0.01	<0.01	<0.01	<0.01
Massport Shuttle Buses	<0.01	<0.01	<0.01	<0.01
Massport Fleet Vehicles	<0.01	<0.01	<0.01	<0.01
Off-airport Vehicles (Public)	0.03	<0.01	<0.01	0.03
Off-airport Vehicles (Airport Employees)	<0.01	<0.01	<0.01	<0.01
Off-airport Vehicles (Tenant Employees)	0.02	<0.01	<0.01	0.02
Stationary Sources				
Boilers	0.03	<0.01	<0.01	0.03
Generators, Snow melters, etc.	<0.01	<0.01	<0.01	<0.01
Fire Training Facility	<0.01	<0.01	<0.01	<0.01
Electrical Consumption	0.07	<0.01	<0.01	0.07

1 Units expressed as million metric tons of CO_2 equivalent (MMT CO_2 Eq): 1 metric ton = 1.1 short tons.

Table I-13 compares the total GHG emission from Logan Airport to the totals GHG emissions for Massachusetts.

Table I-13 Logan Airport GHG Emissions Compared to Massachusetts Totals[1]

	CO_2	N_2O	CH_4	Totals
Logan Airport Emissions[2]	0.56	<0.01	<0.01	0.56
Massachusetts[3]	82.1	1.3	1.2	84.6
Percent of Logan Airport to Massachusetts[4]	<1%	<1%	<1%	<1%

1 Units expressed as million metric tons of CO_2 equivalents (MMT CO_2 Eq): 1 metric ton = 1.1 short tons.
2 Total from Massport, tenants, and public categories.
3 Climate Analysis Indicators Tool (CAIT US) Version 4.0. (Washington, DC: World Resources Institute, 2010)
4 Percentages represent the relative amount Logan-related emissions compared to the state totals.

Table I-14 provides a comparison between Airport-related GHG emissions from 2007 though 2009. Notably, GHG emissions in 2009 were 14 percent lower than 2008 levels. In order to equally compare to previous years, the 2009 emissions are summarized in a manner similar to previous years.

Table I-14 Comparison of Estimated Total Greenhouse Gas Emissions (MMT of CO_2eq) at Logan Airport - 2007 through 2009

Source	2007	2008	2009
Direct Emissions[2]			
Aircraft[3]	0.22	0.21	0.19
GSE/APUs	0.08	0.08	0.02
Motor vehicles[4]	0.03	0.03	0.03
Other sources[5]	0.04	0.03	0.03
Total Direct Emissions	0.37	0.35	0.27
Indirect Emissions[6]			
Aircraft[7]	0.18	0.17	0.17
Motor vehicles[8]	0.05	0.05	0.05
Electrical consumption[9]	0.09	0.08	0.07
Total Indirect Emissions	0.32	0.30	0.29
Total Emissions[10]	0.69	0.65	0.56
Percent of State Totals[11]	<1	<1	<1

1 MMT - million metric tons of CO_2 equivalents (1 MMT = 1.1M Short Tons). CO_2 equivalents (CO_2eq) are bases for reporting the three primary GHGs (e.g., CO_2, N_2O and CH_4) in common units. Quantities are reported as "rounded" and truncated values for ease of addition.
2 Direct emissions are those that occur in areas located within the Airport's geographic boundaries.
3 Direct aircraft emissions based engine start-up, taxi-in, taxi-out and ground-based delay emissions.
4 Direct motor vehicle emissions based on on-site vehicle miles traveled (VMT).
5 Other sources include Central Heating and Cooling Plant, emergency generators, snow melters and live fire training facility.
6 Indirect emissions are those that occur off the Airport site.
7 Indirect aircraft emissions are based on take-off, climb-out and landing emissions which occur up to an altitude of 3,000 ft., the limits of the landing/take-off (LTO) cycle
8 Indirect motor vehicle emissions based on off-site Airport-related VMT and an average round trip distance of 60.2 miles (2003 Passenger Ground Access Survey).
9 Electrical consumption emissions occur off-airport at power generating plants.
10 Total Emissions = Direct +Indirect.
11 Percentage based on relative amount of Airport total of direct emissions to statewide total from World Resources Institute (cait.wri.org).

J

Water Quality/ Environmental Compliance and Management

This appendix provides detailed information in support of *Chapter 8, Water Quality/ Environmental Compliance and Management:*

Table J-1 NPDES Permit Stormwater Outfall Monitoring Requirements

	North Outfall 001		West Outfall 002		Maverick Outfall 003	
Monitoring Event	Field Measurement	Laboratory Analysis	Field Measurement	Laboratory Analysis	Field Measurement	Laboratory Analysis
Monthly Dry Weather	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform Enterococcus	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform Enterococcus	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform Enterococcus
Monthly Wet Weather	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform Enterococcus	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform Enterococcus	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform Enterococcus
Quarterly Wet Weather	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene
Deicing Episode (2/Deicing Season)	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole	Not Required	Not Required
Whole Effluent Toxicity (1st and 3rd Year Deicing Season)	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Not Required
Treatment System Sampling (Internal Outfalls)[7]	pH Quanity, Gallons	Oil and Grease TSS[1] Benzene[2]	Not Required	Not Required	Not Required	Not Required

Table J-1 NPDES Permit Stormwater Outfall Monitoring Requirements (continued)

	Northwest Outfall 005		Porter Outfall 003 (3 upstream locations)		Select Runway/Perimeter Outfalls	
Monitoring Event	Field Measurement	Laboratory Analysis	Field Measurement	Laboratory Analysis	Field Measurement	Laboratory Analysis
Monthly Dry Weather	Not Required	Not Required	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform Enterococcus	Not Required	Not Required
Monthly Wet Weather	Not Required	Not Required	pH Flow Rate	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform Enterococcus	Not Required	Not Required
Quarterly Wet Weather	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2]	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH	Oil and Grease TSS[1] Benzene[2]
Deicing Episode (2/Deicing Season)	Not Required	Not Required	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole
Whole Effluent Toxicity (1st and 3rd Year Deicing Season)	Not Required	Not Required	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Not Required
Treatment System Sampling (Internal Outfalls)[7]	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required

Notes: Requirements are from NPDES Permit MA0000787, issued July 31, 2007.

1 TSS - Total Suspended Solids
2 Benzene must be collected with HDPE bailer.
3 PAH - Polycyclic Aromatic Hydrocarbons
4 BOD5 - Biological Oxygen Demand
5 COD - Chemical Oxygen Demand
6 Flow Rate will be estimated based on measured precipitation and the hydraulic model developed for the Logan Airport drainage system.
7 Outfalls 001D and 001E samples collected by Swissport.

Table J-2 Logan Airport 2009 Monthly Monitoring Results for First Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)
001A – North Outfall	1/28/2009	Wet Weather	4.22	0.34	7.45	<4.0	12	<1.0	0.10	110	20
002A – West Outfall	1/28/2009	Wet Weather	14.32	1.16	7.54	<4.0	20	<1.0	0.14	10	<10
004A – Maverick Street Outfall	1/28/2009	Wet Weather	1.42	0.11	7.44	<4.4	50	<1.0	0.05	360	<10
001C – North Outfall	1/14/2009	Dry Weather				<4.0	27	1.1	0.18	170	10
002C – West Outfall	1/14/2009	Dry Weather				<4.0	38	<1.0	0.22	3,100	460
004C – Maverick Street Outfall	1/14/2009	Dry Weather				<4.0	16	<1.0	0.11	60	<10
001A – North Outfall	2/3/2009	Wet Weather	2.76	0.17	7.78	<4.0	17	<1.0	0.21	2,200	730
002A – West Outfall	2/3/2009	Wet Weather	9.68	0.59	7.88	<4.0	24	<1.0	0.17	290	160
004A – Maverick Street Outfall	2/3/2009	Wet Weather	0.92	0.06	7.43	<4.0	28	<1.0	0.20	340	10
001C – North Outfall	2/2/2009	Dry Weather				<4.0	26	<5.0	0.25	5,900	240
002C – West Outfall	2/2/2009	Dry Weather				<4.0	24	<1.0	0.13	80	<10
004C – Maverick Street Outfall	2/2/2009	Dry Weather				<4.0	12	<1.0	0.06	20	<10
001A – North Outfall	3/9/2009	Wet Weather	1.61	0.18	8.06	6.5	54	<1.0	0.37	1,400	55
002A – West Outfall	3/9/2009	Wet Weather	5.81	0.63	7.70	<4.0	18	<1.0	0.19	80	30
004A – Maverick Street Outfall	3/9/2009	Wet Weather	0.54	0.06	8.14	26	230	<1.0	16	900	450
001C – North Outfall	3/16/2009	Dry Weather				<4.4	15	<1.0	0.10	560	<10
002C – West Outfall	3/16/2009	Dry Weather				<4.0	18	<1.0	0.13	900	<10
004C – Maverick Street Outfall	3/16/2009	Dry Weather				<4.0	11	<1.0	0.07	760	<10
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids
NA Not Analyzed

Table J-3 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for First Quarter – Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)
003 - Porter Street Outfall 1	1/28/2009	Wet Weather	-	-	7.85	<4.0	15	<1.0	0.09	<10	<10
003 - Porter Street Outfall 2	1/28/2009	Wet Weather	-	-	8.33	5.7	21	<1.0	0.27	<10	20
003 - Porter Street Outfall 3	1/28/2009	Wet Weather	-	-	7.70	<4.0	<5.0	<1.0	0.20	<10	<10
003 - Porter Street Outfall Average	1/28/2009	Wet Weather	3.90	0.32	7.96	1.9	12	0.0	0.19	1.0	2.7
003 - Porter Street Outfall 1	1/14/2009	Dry Weather				<4.0	8.5	<1.0	0.07	<10	<10
003 - Porter Street Outfall 2	1/14/2009	Dry Weather				<4.0	15	<1.0	0.17	10	10
003 - Porter Street Outfall 3	1/14/2009	Dry Weather				<4.0	<5.0	<1.0	0.17	<10	<10
003 - Porter Street Outfall Average	1/14/2009	Dry Weather				0.0	7.8	0.0	0.14	2.2	2.2
003 - Porter Street Outfall 1	2/22/2009	Wet Weather	-	-	7.61	<4.0	18	<1.0	0.16	<10	60
003 - Porter Street Outfall 2	2/22/2009	Wet Weather	-	-	7.91	4.7	10	<1.0	0.74	10	210
003 - Porter Street Outfall 3	2/22/2009	Wet Weather	-	-	7.29	<4.0	<5.0	<1.0	0.18	<10	<10
003 - Porter Street Outfall Average	2/22/2009	Wet Weather	2.40	0.16	7.60	1.6	9.3	0.0	0.36	2.2	23.3
003 - Porter Street Outfall 1	2/2/2009	Dry Weather				<4.0	35	<1.0	0.09	<10	<10
003 - Porter Street Outfall 2	2/2/2009	Dry Weather				8.7	140	<1.0	0.28	<10	20
003 - Porter Street Outfall 3	2/2/2009	Dry Weather				<4.0	18	<1.0	0.18	<10	10
003 - Porter Street Outfall Average	2/2/2009	Dry Weather				2.9	64.3	0.0	0.18	1.0	5.8
003 - Porter Street Outfall 1	3/9/2009	Wet Weather	-	-	8.25	9.2	97	<1.0	8.0	80	1,100
003 - Porter Street Outfall 2	3/9/2009	Wet Weather	-	-	8.41	<4.0	16	<1.0	0.13	20	180
003 - Porter Street Outfall 3	3/9/2009	Wet Weather	-	-	7.47	<4.0	8.1	<1.0	0.15	<10	<10
003 - Porter Street Outfall Average	3/9/2009	Wet Weather	1.54	0.18	8.04	3.1	40.4	0.0	2.76	11.7	58.3
003 - Porter Street Outfall 1	3/16/2009	Dry Weather				<4.4	20	<1.0	0.06	10	<10
003 - Porter Street Outfall 2	3/16/2009	Dry Weather				<4.4	24	<1.0	0.15	50	<10
003 - Porter Street Outfall 3	3/16/2009	Dry Weather				<4.0	<5.0	<1.0	0.14	<10	<10
003 - Porter Street Outfall Average	3/16/2009	Dry Weather				0.0	14.7	0.0	0.12	7.9	1.0
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Porter Street Outfall location 3 (PSO-MH75) was dry during the sampling event, therefore PSO-MH78 was sampled in its place.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids
NA Not Analyzed

Table J-4 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Second Quarter – North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)
001A – North Outfall	4/21/2009	Wet Weather	3.8	0.4	7.48	5.7	81	<1.0	2.7	300	160
002A – West Outfall	4/21/2009	Wet Weather	13.4	1.4	7.50	<4.0	32	<1.0	0.18	500	460
004A – Maverick Street Outfall	4/21/2009	Wet Weather	1.0	0.1	7.02	<4.0	44	<1.0	0.21	5,000	590
001C – North Outfall	4/10/2009	Dry Weather				<4.0	16	<1.0	0.12	80	10
002C – West Outfall	4/10/2009	Dry Weather				<4.0	15	<1.0	0.09	120	40
004C – Maverick Street Outfall	4/10/2009	Dry Weather				<4.0	<5.0	<1.0	0.06	10	10
001A – North Outfall	5/27/2009	Wet Weather	1.11	0.05	7.47	<4.0	17	<1.0	0.16	350	70
002A – West Outfall	5/27/2009	Wet Weather	3.88	0.18	7.55	<4.0	30	<1.0	1.6	260	390
004A – Maverick Street Outfall	5/27/2009	Wet Weather	0.28	0.01	7.54	<4.0	34	<1.0	0.05	<10	80
001C – North Outfall	5/13/2009	Dry Weather				<4.0	10	<1.0	0.18	1,800	20
002C – West Outfall	5/13/2009	Dry Weather				<4.0	12	<1.0	0.15	1,300	130
004C – Maverick Street Outfall	5/13/2009	Dry Weather				<4.0	12	<1.0	<0.05	<10	<10
001A – North Outfall	6/12/2009	Wet Weather	1.66	0.19	8.31	<4.0	6.4	<1.0	0.08	2,600	35,000
002A – West Outfall	6/12/2009	Wet Weather	6.07	0.65	8.40	<4.0	22	<1.0	0.13	2,000	39,000
004A – Maverick Street Outfall	6/12/2009	Wet Weather	0.46	0.05	7.95	<4.0	6.0	<1.0	0.06	2,700	7,400
001C – North Outfall	6/4/2009	Dry Weather				<4.0	5.1	<1.0	0.16	450	70
002C – West Outfall	6/4/2009	Dry Weather				<4.0	14	<1.0	0.09	250	260
004C – Maverick Street Outfall	6/4/2009	Dry Weather				<4.0	13	<1.0	0.05	90	400
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids
NA Not Analyzed

Table J-5 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Second Quarter – Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)
003 - Porter Street Outfall 1	4/21/2009	Wet Weather	---	---	7.36	7.4	59	<1.0	0.09	<10	<10
003 - Porter Street Outfall 2	4/21/2009	Wet Weather	---	---	7.98	<4.0	11	<1.0	0.09	<10	50
003 - Porter Street Outfall 3	4/21/2009	Wet Weather	---	---	6.71	<4.0	<5.0	<1.0	0.14	<10	<10
003 - Porter Street Outfall Average	4/21/2009	Wet Weather	2.7	0.3	7.35	2.5	23.3	0.0	0.11	1.0	3.7
003 - Porter Street Outfall 1	4/10/2009	Dry Weather				<4.0	9.0	<1.0	0.07	<10	<10
003 - Porter Street Outfall 2	4/10/2009	Dry Weather				<4.0	18	<1.0	0.10	30	10
003 - Porter Street Outfall 3	4/10/2009	Dry Weather				<4.0	<5.0	<1.0	0.12	<10	<10
003 - Porter Street Outfall Average	4/10/2009	Dry Weather				0.0	9.0	0.0	0.10	3.1	2.2
003 - Porter Street Outfall 1	5/27/2009	Wet Weather	---	---	8.48	<4.0	17	<1.0	0.22	<10	40
003 - Porter Street Outfall 2	5/27/2009	Wet Weather	---	---	8.51	<4.0	<5.0	<1.0	0.31	60	1,200
003 - Porter Street Outfall 3	5/27/2009	Wet Weather	---	---	7.33	<4.0	6.1	<1.0	0.12	<10	<10
003 - Porter Street Outfall Average	5/27/2009	Wet Weather	0.79	0.04	8.11	0.0	7.7	0.0	0.22	3.9	36.3
003 - Porter Street Outfall 1	5/13/2009	Dry Weather				<4.0	<5.0	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	5/13/2009	Dry Weather				<4.0	9.9	<1.0	0.11	50	20
003 - Porter Street Outfall 3	5/13/2009	Dry Weather				<4.0	<5.0	<1.0	0.12	<10	<10
003 - Porter Street Outfall Average	5/13/2009	Dry Weather				0.0	3.3	0.0	0.08	3.7	2.7
003 - Porter Street Outfall 1	6/12/2009	Wet Weather	---	---	7.98	<4.0	50	<1.0	0.11	410	140
003 - Porter Street Outfall 2	6/12/2009	Wet Weather	---	---	8.38	<4.0	<5.0	<1.0	0.08	10	740
003 - Porter Street Outfall 3	6/12/2009	Wet Weather	---	---	7.43	<4.0	<5.0	<1.0	0.11	<10	120
003 - Porter Street Outfall Average	6/12/2009	Wet Weather	1.38	0.14	7.93	0.0	16.7	0.0	0.10	16.0	232
003 - Porter Street Outfall 1	6/4/2009	Dry Weather				<4.0	<5.0	<1.0	<0.05	10	20
003 - Porter Street Outfall 2	6/4/2009	Dry Weather				<4.0	6.4	<1.0	0.12	20	30
003 - Porter Street Outfall 3	6/4/2009	Dry Weather				<4.0	<5.0	<1.0	0.12	<10	<10
003 - Porter Street Outfall Average	6/4/2009	Dry Weather				0.0	2.1	0.0	0.08	5.8	8.4
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Porter Street Outfall location 3 (PSO-MH75) was dry during the sampling event, therefore PSO-MH78 was sampled in its place.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids
NA Not Analyzed

Table J-6 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Third Quarter – North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)	Klebsiella[1] (cfu/100mL)
001A – North Outfall	7/21/2009	Wet Weather	7.70	0.7	7.90	<4.0	6.8	<1.0	0.39	4,700	3,600	
002A – West Outfall	7/21/2009	Wet Weather	28.40	2.3	7.67	<4.0	8.0	<1.0	0.43	6,400	3,700	
004A – Maverick Street Outfall	7/21/2009	Wet Weather	1.80	0.2	7.34	<4.0	49	<1.0	0.31	3,600	4,700	
001C – North Outfall	7/15/2009	Dry Weather				<4.0	6.1	<1.0	0.12	1,500	200	
002C – West Outfall	7/7/2009	Dry Weather				<4.0	15	<1.0	0.08	2,200	200	
004C – Maverick Street Outfall	7/7/2009	Dry Weather				<4.0	10	<1.0	<0.05	30	30	
001A – North Outfall	8/29/2009	Wet Weather	5.3	0.4	7.09	<4.0	<5.0	<1.0	0.14	NA	NA	
002A – West Outfall	8/29/2009	Wet Weather	17.6	1.2	6.70	<4.0	6.7	<1.0	0.13	NA	NA	
004A – Maverick Street Outfall	8/29/2009	Wet Weather	1.3	0.1	7.61	<4.0	9.7	<1.0	0.13	NA	NA	
001C – North Outfall	8/4/2009	Dry Weather				<4.0	<5.0	<1.0	0.10	14,000	170	9,000
002C – West Outfall	8/4/2009	Dry Weather				<4.0	11	<1.0	0.08	1,400	190	NA
004C – Maverick Street Outfall	8/4/2009	Dry Weather				<4.0	9.3	<1.0	<0.05	1,900	600	NA
001A – North Outfall	9/27/2009	Wet Weather	7.00	0.34	8.40	<4.0	5.5	<1.0	0.29	NA	NA	
002A – West Outfall	9/27/2009	Wet Weather	24.22	2.24	8.36	<4.0	16	<1.0	0.24	NA	NA	
004A – Maverick Street Outfall	9/27/2009	Wet Weather	1.70	0.05	8.40	<4.4	23	<1.0	0.35	NA	NA	
001C – North Outfall	9/4/2009	Dry Weather				<4.0	24	<1.0	0.08	7,300	240	6,000
002C – West Outfall	9/4/2009	Dry Weather				<4.0	12	<1.0	0.15	2,500	240	NA
004C – Maverick Street Outfall	9/4/2009	Dry Weather				<4.0	17	<1.0	0.14	40	40	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	----	Report	Report	Report	Report	Report	Report

Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

1 Klebsiella is an indication of non-fecal coliform bacteria and is tested for at the N. Outfall when fecal coliform concentration exceeds 5000 cfu/100ml.

TSS Total Suspended Solids

NA Not Analyzed

Table J-7 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Third Quarter – Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform[1] (cfu/100mL)	Enterococcus[1] (cfu/100mL)
003 - Porter Street Outfall 1	7/21/2009	Wet Weather	---	---	7.81	<4.0	41	<1.0	0.33	32,000	23,000
003 - Porter Street Outfall 2	7/21/2009	Wet Weather	---	---	7.71	<4.0	<5.0	<1.0	0.11	55	250
003 - Porter Street Outfall 3	7/21/2009	Wet Weather	---	---	7.78	<4.0	<5.0	<1.0	0.20	50	50
003 - Porter Street Outfall Average	7/21/2009	Wet Weather	5.40	0.40	7.77	0.0	13.7	0.0	0.21	444.8	660
003 - Porter Street Outfall 1	7/7/2009	Dry Weather				<4.4	<5.0	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	7/7/2009	Dry Weather				<4.0	6.1	<1.0	<0.05	90	100
003 - Porter Street Outfall 3	7/7/2009	Dry Weather				<4.0	<5.0	<1.0	0.10	60	270
003 - Porter Street Outfall Average	7/7/2009	Dry Weather				0.0	2.0	0.0	0.03	18	30
003 - Porter Street Outfall 1	8/29/2009	Wet Weather	---	---	7.92	<4.0	14	<1.0	0.14	NA	NA
003 - Porter Street Outfall 2	8/29/2009	Wet Weather	---	---	7.39	<4.4	<5.0	<1.0	<0.05	NA	NA
003 - Porter Street Outfall 3	8/29/2009	Wet Weather	---	---	7.16	<4.0	<5.0	<1.0	0.13	NA	NA
003 - Porter Street Outfall Average	8/29/2009	Wet Weather	2.2	0.2	7.49	0.0	4.7	0.0	0.09	NA	NA
003 - Porter Street Outfall 1	8/4/2009	Dry Weather				<4.0	<5.0	<1.0	0.20	<10	10
003 - Porter Street Outfall 2	8/4/2009	Dry Weather				<4.0	17	<1.0	0.06	30	20
003 - Porter Street Outfall 3	8/4/2009	Dry Weather				<4.0	<5.0	<1.0	0.18	<10	10
003 - Porter Street Outfall Average	8/4/2009	Dry Weather				0.0	5.7	0.0	0.15	3	13
003 - Porter Street Outfall 1	9/27/2009	Wet Weather	---	---	8.38	<4.0	5.1	<1.0	0.14	NA	NA
003 - Porter Street Outfall 2	9/27/2009	Wet Weather	---	---	8.40	<4.0	<5.0	<1.0	0.11	NA	NA
003 - Porter Street Outfall 3	9/27/2009	Wet Weather	---	---	7.64	<4.0	<5.0	<1.0	0.09	NA	NA
003 - Porter Street Outfall Average	9/27/2009	Wet Weather	4.25	0.20	8.14	0.0	1.7	0.0	0.11	NA	NA
003 - Porter Street Outfall 1	9/4/2009	Dry Weather				<4.4	16	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	9/4/2009	Dry Weather				5.0	45	<1.0	0.94	53,000	51,000
003 - Porter Street Outfall 3	9/4/2009	Dry Weather				<4.0	<5.0	<1.0	0.16	<10	10
003 - Porter Street Outfall Average	9/4/2009	Dry Weather				1.7	20.3	0.0	0.37	38	80
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Porter Street Outfall location 3 (PSO-MH75) had limited flow during the wet sampling event and was dry during the dry sampling event, therefore PSO-MH78 was sampled in its place.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

1 In August and September, at the Porter Street Outfalls, wet weather samples were not analyzed for fecal coliform or enterococcus due to 6-hr hold time during weekend sampling event.

TSS Total Suspended Solids

NA Not Analyzed

Table J-8 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Fourth Quarter –North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)	Klebsiella[2] (cfu/100mL)
001A – North Outfall	10/7/2009	Wet Weather	3.77	0.53	7.31	<4.0	<5.0	<1.0	0.15	4,000	2,000	
002A – West Outfall	10/7/2009	Wet Weather	9.58	1.72	7.19	<4.0	13	<1.0	0.17	6,200	1,600	
004A – Maverick Street Outfall	10/7/2009	Wet Weather	0.92	0.11	7.25	<4.4	<5.0	<1.0	0.28	11,000	49,000	
001C – North Outfall	10/22/2009	Dry Weather				<4.0	14	<1.0	0.09	3,300	200	
002C – West Outfall	10/22/2009	Dry Weather				<4.0	14	<1.0	0.09	650	110	
004C – Maverick Street Outfall[1]	10/22/2009	Dry Weather				NS	NS	NS	NS	NS	NS	
001A – North Outfall	11/20/2009	Wet Weather	4.91	0.42	8.13	<4.0	22	<1.0	0.15	910	10	
002A – West Outfall	11/20/2009	Wet Weather	15.37	1.70	7.60	<4.4	22	<1.0	0.24	1,300	3,600	
004A – Maverick Street Outfall	11/20/2009	Wet Weather	1.08	0.09	7.68	5.0	86	<1.0	0.11	13,000	77,000	
001C – North Outfall	11/6/2009	Dry Weather				<4.0	25	<1.0	0.09	3,600	60	
002C – West Outfall	11/6/2009	Dry Weather				<4.0	12	<1.0	0.08	710	260	
004C – Maverick Street Outfall[1]	11/6/2009	Dry Weather				NS	NS	NS	NS	NS	NS	
001A – North Outfall	12/9/2009	Wet Weather	3.6	0.6	7.60	4.5	27	<1.0	0.12	5,700	1,500	5,100
002A – West Outfall	12/9/2009	Wet Weather	13.3	2.5	7.14	<4.0	25	<1.0	0.11	310	560	NA
004A – Maverick Street Outfall	12/9/2009	Wet Weather	0.9	0.1	7.26	<4.4	13	<1.0	0.06	5,900	1,600	NA
001C – North Outfall	12/18/2009	Dry Weather				<4.0	11	<1.0	0.12	70	20	
002C – West Outfall	12/18/2009	Dry Weather				<4.0	21	<1.0	0.13	310	560	
004C – Maverick Street Outfall[1]	12/18/2009	Dry Weather				NS	NS	NS	NS	NS	NS	
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	
Average Daily			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	

Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

1 The Maverick Street Outfall was dry during the dry sampling event, therefore no sample was analyzed.
2 Klebsiella is an indication of non-fecal coliform bacteria and is tested for at the N. Outfall when fecal coliform concentration exceeds 5000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed
NS Not Sampled. No discharge therefore no sample collected.

Table J-9 Logan Airport 2009 Stormwater Outfalls Monthly Monitoring Results for Fourth Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)	Surfactant (mg/L)	Fecal Coliform (cfu/100mL)	Enterococcus (cfu/100mL)
003 - Porter Street Outfall 1	10/7/2009	Wet Weather	---	---	7.50	<4.0	63	<1.0	0.14	2,300	14,000
003 - Porter Street Outfall 2	10/7/2009	Wet Weather	---	---	7.95	<4.0	6.8	<1.0	<0.05	800	50
003 - Porter Street Outfall 3	10/7/2009	Wet Weather	---	---	6.83	19	<5.0	<1.0	0.09	250	100
003 - Porter Street Outfall Average	10/7/2009	Wet Weather	1.47	0.37	7.43	6.3	23.3	0.0	0.08	772	412
003 - Porter Street Outfall 1	10/22/2009	Dry Weather				<4.4	140	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	10/22/2009	Dry Weather				<4.4	10	<1.0	<0.05	<10	10
003 - Porter Street Outfall 3	10/22/2009	Dry Weather				<4.0	7.0	<1.0	0.11	40	10
003 - Porter Street Outfall Average	10/22/2009	Dry Weather				0.0	52.3	0.0	0.04	3.4	4.6
003 - Porter Street Outfall 1	11/20/2009	Wet Weather	---	---	8.47	<4.4	14	<1.0	0.12	<10	<10
003 - Porter Street Outfall 2	11/20/2009	Wet Weather	---	---	8.42	<4.4	<5.0	<1.0	0.14	<10	100
003 - Porter Street Outfall 3	11/20/2009	Wet Weather	---	---	7.72	<4.0	<5.0	<1.0	0.18	460	250
003 - Porter Street Outfall Average	11/20/2009	Wet Weather	2.85	0.26	8.20	0.0	4.7	0.0	0.15	7.7	29
003 - Porter Street Outfall 1	11/6/2009	Dry Weather				<4.0	<5.0	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	11/6/2009	Dry Weather				<4.0	<5.0	<1.0	0.21	60	10
003 - Porter Street Outfall 3	11/6/2009	Dry Weather				<4.0	<5.0	<1.0	0.14	10	<10
003 - Porter Street Outfall Average	11/6/2009	Dry Weather				0.0	0.0	0.0	0.12	8.4	2.2
003 - Porter Street Outfall 1	12/9/2009	Wet Weather	---	---	7.88	4.5	66	<1.0	0.19	680	3,000
003 - Porter Street Outfall 2	12/9/2009	Wet Weather	---	---	8.11	<4.4	5.8	<1.0	<0.05	20	40
003 - Porter Street Outfall 3	12/9/2009	Wet Weather	---	---	7.24	<4.0	<5.0	NA[1]	0.13	10	10
003 - Porter Street Outfall Average	12/9/2009	Wet Weather	1.7	0.4	7.74	1.5	24	0.0	0.11	51	106
003 - Porter Street Outfall 1	12/9/2009	Dry Weather				<4.0	7.4	<1.0	<0.05	<10	<10
003 - Porter Street Outfall 2	12/9/2009	Dry Weather				<4.0	<5.0	<1.0	<0.05	<10	10
003 - Porter Street Outfall 3	12/9/2009	Dry Weather				<4.0	<5.0	<1.0	0.19	<10	<10
003 - Porter Street Outfall Average	12/9/2009	Dry Weather				0.0	2.5	0.0	0.06	1.0	2.2
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Daily			Report	Report	6.0 to 8.5	–	Report	Report	Report	Report	Report

Notes: Porter Street Outfall location 3 (PSO-MH75) had limited flow during the wet sampling event and was dry during the dry sampling event, therefore PSO-MH78 was sampled in its place.
Bold values exceed maximum daily discharge limitation.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

1 Benzene vials from Porter Street Outfall location 3 were broken during transport to the laboratory, therefore no results are reported for the December wet weather event.
TSS Total Suspended Solids
NA Not Analyzed

Table J-10 Logan Airport 2009 Quarterly Wet Weather Monitoring Results - North, West, Maverick Street, and Porter Street Stormwater Outfalls

		Wet Weather									
	Date	pH (S.U.)	Benzo(a)-anthracene (ug/L)	Benzo(a)-pyrene (ug/L)	Benzo(b)-fluoranthene (ug/L)	Benzo(k)-fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h,)-anthracene (ug/L)	Indeno(1,2,3-cd)-pyrene (ug/L)	Naphthalene (ug/L)	Total PAHs (ug/L)
001 - North Outfall	2/22/2009	7.13	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.25	0.25
002 - West Outfall	2/22/2009	7.26	3.7	6.2	6.2	4.0	4.6	<1.0	3.0	2.6	30.3
004 - Maverick Street Outfall	2/22/2009	7.68	2.5	<1.0	3.9	2.1	1.3	<1.0	1.7	<1.0	11.5
003 - Porter Street Outfall 1	2/22/2009	7.75	<0.20	1.0	0.78	0.43	0.29	<0.20	<0.20	<0.20	2.50
003 - Porter Street Outfall 2	2/22/2009	8.07	0.25	0.30	0.98	0.26	0.56	<0.19	0.31	<0.19	2.66
003 - Porter Street Outfall 3	2/22/2009	7.39	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.0
003 - Porter Street Outfall Average	2/22/2009		0.08	0.43	0.59	0.23	0.28	0.0	0.10	0.0	1.72
001 - North Outfall	6/12/2009	8.31	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.59	0.59
002 - West Outfall	6/12/2009	8.40	<0.20	<0.20	0.33	<0.20	<0.20	<0.20	<0.20	<0.20	0.33
004 - Maverick Street Outfall	6/12/2009	7.95	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
003 - Porter Street Outfall 1	6/12/2009	7.98	0.54	<0.20	1.1	0.37	0.67	<0.20	0.35	<0.20	3.03
003 - Porter Street Outfall 2	6/12/2009	8.38	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall 3	6/12/2009	7.43	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall Average	6/12/2009	7.93	0.18	0.00	0.37	0.12	0.22	0.0	0.12	0.0	1.01
001 - North Outfall	9/27/2009	8.40	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
002 - West Outfall	9/27/2009	8.36	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
004 - Maverick Street Outfall	9/27/2009	8.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall 1	9/27/2009	8.38	0.38	0.52	0.56	0.28	0.35	<0.20	0.56	0.34	2.99
003 - Porter Street Outfall 2	9/27/2009	8.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall 3	9/27/2009	7.64	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall Average	9/27/2009	8.14	0.13	0.17	0.19	0.09	0.12	0.00	0.19	0.11	1.00
001 - North Outfall	11/20/2009	8.13	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
002 - West Outfall	11/20/2009	7.60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.2	1.2
004 - Maverick Street Outfall	11/20/2009	7.68	<0.20	0.20	0.40	<0.20	0.30	<0.20	<0.20	<0.20	0.90
003 - Porter Street Outfall 1	11/20/2009	8.47	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall 2	11/20/2009	8.42	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
003 - Porter Street Outfall 3	11/20/2009	7.72	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
003 - Porter Street Outfall Average	11/20/2009	8.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily		6.0 to 8.5	Report	Report	Report	Report	Report	Report	Report	Report	Report Total

Table J-11 Logan Airport 2009 Quarterly Wet Weather Monitoring Results - Northwest and Runway/Perimeter Stormwater Outfalls

	Date	Maximum Daily Flow (MGD)	Average Quarterly Flow (MGD)	pH (SU)	Oil and Grease (mg/L)	Total Suspended Solids (mg/L)	Benzene (ug/L)
005 - Northwest Outfall	2/22/2009	0.37	0.02	7.31	<4.4	33	<1.0
006- Runway/ Perimeter Outfall (A9)	2/22/2009	0.24	0.01	7.87	<4.0	7.2	<1.0
006- Runway/ Perimeter Outfall (A18)	2/22/2009	0.04	0.00	7.23	<4.0	55	<1.0
006- Runway/ Perimeter Outfall (A21)	2/22/2009	1.65	0.06	6.75	<4.0	42	<1.0
006- Runway/ Perimeter Outfall (A23)	2/22/2009	0.20	0.01	7.36	<4.0	25	<1.0
006- Runway/ Perimeter Outfall (A33)	2/22/2009	0.20	0.01	7.47	<4.0	26	<1.0
006- Runway/ Perimeter Outfall (A34)	2/22/2009	0.58	0.02	7.87	<4.0	11	<1.0
006- Runway/ Perimeter Outfall (A38)	2/22/2009	0.25	0.01	7.22	<4.0	<5.0	<1.0
006- Runway/Perimeter Outfall Average	2/22/2009	0.45	0.02	7.40	0.0	24	0.0
005 - Northwest Outfall	6/12/2009	0.24	0.03	7.95	<4.0	60	<1.0
006- Runway/ Perimeter Outfall (A9)	6/12/2009	0.13	0.03	8.19	<4.4	5.7	<1.0
006- Runway/ Perimeter Outfall (A18)	6/12/2009	0.02	0.00	7.59	<4.0	<5.0	<1.0
006- Runway/ Perimeter Outfall (A20)	6/12/2009	0.08	0.01	7.95	<4.4	<5.0	<1.0
006- Runway/ Perimeter Outfall (A21)	6/12/2009	0.66	0.16	7.28	<4.4	29	<1.0
006- Runway/ Perimeter Outfall (A23)	6/12/2009	0.11	0.02	7.58	<4.0	38	<1.0
006- Runway/ Perimeter Outfall (A33)	6/12/2009	0.09	0.02	7.81	<4.4	6.0	<1.0
006- Runway/ Perimeter Outfall (A38)	6/12/2009	0.08	0.01	7.13	<4.0	5.9	<1.0
006- Runway/Perimeter Outfall Average	6/12/2009	0.17	0.04	7.65	0.0	12	0.0
005 - Northwest Outfall	9/27/2009	0.93	0.04	7.80	<4.4	29	<1.0
006- Runway/ Perimeter Outfall (A9)	9/27/2009	0.33	0.02	7.84	<4.0	23	<1.0
006- Runway/ Perimeter Outfall (A15)	9/27/2009	0.17	0.01	8.10	<4.0	<5.0	<1.0
006- Runway/ Perimeter Outfall (A20)	9/27/2009	0.15	0.01	8.06	<4.0	11	<1.0
006- Runway/ Perimeter Outfall (A21)	9/27/2009	3.50	0.17	7.78	<4.0	9.2	<1.0
006- Runway/ Perimeter Outfall (A33)	9/27/2009	0.15	0.01	8.18	<4.0	5.5	<1.0
006- Runway/ Perimeter Outfall (A36)	9/27/2009	0.07	0.00	7.59	<4.0	<5.0	<1.0
006- Runway/ Perimeter Outfall (A38)	9/27/2009	0.49	0.02	7.63	<4.0	5.0	<1.0
006- Runway/Perimeter Outfall Average	9/27/2009	0.69	0.03	7.88	0.0	7.7	0.0
005 - Northwest Outfall	11/20/2009	0.64	0.05	6.76	<4.0	83	<1.0
006- Runway/ Perimeter Outfall (A9)	11/20/2009	0.40	0.04	8.24	4.7	<5.0	<1.0
006- Runway/ Perimeter Outfall (A17)	11/20/2009	0.14	0.01	8.36	<4.0	<5.0	<1.0
006- Runway/ Perimeter Outfall (A20)	11/20/2009	0.18	0.02	8.47	<4.0	<5.0	<1.0
006- Runway/ Perimeter Outfall (A21)	11/20/2009	3.20	0.30	8.25	<4.0	7.7	<1.0
006- Runway/ Perimeter Outfall (A23)	11/20/2009	0.31	0.03	8.49	<4.4	6.9	<1.0
006- Runway/ Perimeter Outfall (A33)	11/20/2009	0.21	0.03	6.78	<4.0	9.5	<1.0
006- Runway/ Perimeter Outfall (A38)	11/20/2009	0.41	0.03	7.71	13	280	<1.0
006- Runway/Perimeter Outfall Average	11/20/2009	0.69	0.07	8.04	3.2	44	0.0
Discharge Limitations		Report	Report	Report	Report	Report	Report

Requirements are from NPDES Permit MA 0000787, issued July 31, 2007

Table J-12 Logan Airport 2008 Wet Weather Deicing Monitoring Results - North, West and Porter Street Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD_5 (mg/L)	COD (mg/L)	Total Ammonia Nitrogen (mg/L of N)	Nonylphenol (ug/L)	4-Methyl-1-H-benzotriazole (ug/L)	5-Methyl-1-H-benzotriazole (ug/L)	Tolytriazole (ug/L)	Whole Effluent Toxicity[1]
001 - North Outfall	1/11/2009	2500	4200	7500	15000	0.899	0.9	94.1 J	132.1	226.2	NA
002 - West Outfall	1/11/2009	2400	6800	9500	19000	2.01	0.6	150.1 J	218.1	368.2	NA
003B - Porter Street 1	1/11/2009	350	<50	200	1400	14.1	0.3	55.4 J	96.5	151.9	NA
003B - Porter Street 2	1/11/2009	17	29	75	250	3.55	<0.4	14.5 J	30.4	44.9	NA
003B - Porter Street 3	1/11/2009	<5.0	<5.0	<2.0	46	1.56	<0.4	<0.2	<0.2	<0.2	NA
003B - Porter Street Outfall Average	1/11/2009	122.3	10	91.7	565.3	6.403	0.1	23.3	42.3	65.6	NA
001 - North Outfall	3/2/2009	230	550	710	1900	2.16	<0.20	43.711	46.795	90.506	NA
002 - West Outfall	3/2/2009	<2500	3000	3200	8600	2.12	0.45 J	135.472	209.301	344.773	NA
003B - Porter Street 1	3/2/2009	<2500	<2500	540	5700	34.1	0.41 J	112.898	180.077	292.975	NA
003B - Porter Street 2	3/2/2009	<50	<50	15	60	0.795	0.04 J	<0.100	5.228	5.228	NA
003B - Porter Street 3	3/2/2009	<50	<50	<2.0	150	0.769	<0.20	<0.100	0.068 J	0.068	NA
003B - Porter Street Outfall Average	3/2/2009	0.0	0.0	185	1970	11.888	0.15	56.449	136.327	99.424	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report	Report

Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
J = Value is an estimate calculated by the lab from the response factors of the other two triazole compounds.

1 Whole Effluent Toxicity sample required years 1 and 3.
BOD_5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
NA Not Applicable

Table J-13 Logan Airport 2008 Wet Weather Deicing Monitoring Results - Runway/ Perimeter Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD_5 (mg/L)	COD (mg/L)	Total Ammonia Nitrogen (mg/L of N)	Nonylphenol (ug/L)	4-Methyl-1-H-benzotriazole (ug/L)	5-Methyl-1-H-benzotriazole (ug/L)	Tolytriazole (ug/L)[2]	Whole Effluent Toxicity[1]
006- Runway/ Perimeter (A9)	1/11/2009	<5.0	<5.0	5.5	67	2.16	<0.3	3.0 J	<0.2	3.0	NA
006- Runway/ Perimeter (A18)	1/11/2009	24	<5.0	210	360	46.0	1.1	37.5 J	28.1	65.6	NA
006- Runway/ Perimeter (A20)	1/11/2009	37	<5.0	160	250	21.5	<0.3	20.8 J	14.1	34.9	NA
006- Runway/ Perimeter (A21)	1/11/2009	17	<5.0	14	39	1.88	<0.4	2.7 J	<0.2	2.7	NA
006- Runway/ Perimeter (A23)	1/11/2009	7.5	<5.0	39	69	6.22	0.4	17.9 J	13.4	31.3	NA
006- Runway/ Perimeter (A33)	1/11/2009	<5.0	<5.0	60	110	10.8	<0.3	19.3 J	15.0	34.3	NA
006- Runway/ Perimeter (A38)	1/11/2009	<5.0	<5.0	<2.0	67	0.510	<0.4	<0.2	<0.2	<0.2	NA
006- Runway/Perimeter Outfall Average		12.2	0.0	69.8	137	12.724	0.2	14.5	10.1	24.5	NA
006- Runway/ Perimeter (A9)	3/2/2009	<50	<50	<2.0	32	3.3	<0.20	8.042	2.491 J	10.533	NA
006- Runway/ Perimeter (A18)	3/2/2009	61	<50	110	220	17.3	0.10 J	16.022	4.676 J	20.698	NA
006- Runway/ Perimeter (A20)	3/2/2009	<50	<50	16	160	8.64	<0.20	10.777	3.677 J	14.454	NA
006- Runway/ Perimeter (A21)	3/2/2009	<50	<50	50	26	12.7	<0.20	20.215	6.002	26.217	NA
006- Runway/ Perimeter (A23)	3/2/2009	<50	<50	10	83	8.35	0.13 J	19.433	7.323	26.756	NA
006- Runway/ Perimeter (A33)	3/2/2009	<50	<50	73	190	13.4	0.17 J	42.931	13.798	56.729	NA
006- Runway/ Perimeter (A38)	3/2/2009	<50	<50	<2.0	120	0.61	<0.20	<0.100	<0.100	<0.100	NA
006- Runway/Perimeter Outfall Average	3/2/2009	8.71	0.0	37.0	119	9.186	0.06	16.774	5.424	22.198	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report	NA

Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
J = Value is an estimate calculated by the lab from the response factors of the other two triazole compounds.
1 Whole Effluent Toxicity sample required years 1 and 3.
BOD_5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
NA Not Applicable

Table J-14 History of Logan Airport Stormwater Outfall NPDES Water Quality Monitoring Results - 1993 to 2009

	1993	1994	1995	1996	1997	1998	1999	2000	2001[1]	2002	2003[1]	2004	2005	2006	2007	2008	2009
# / # = Number of samples at or below NPDES limits / Total number of samples taken																	
Oil and Grease (mg/L)																	
North Outfall	30/31	35/36	33/35	29/35	30/35	35/36	29/30	34/36	28/28	36/36	30/32	32/34	33/35	33/33	29/29	23/23	24/24
West Outfall	29/30	36/36	34/34	36/36	34/35	36/36	30/30	35/35	27/28	36/36	31/32	33/34	35/35	32/33	28/28	22/23	24/24
Porter Street Outfall	30/30	35/36	34/34	36/36	35/35	34/36	30/30	35/36	28/28	34/36	32/32	33/34	34/35	33/33	22/22	50/50	72/72
Maverick Street Outfall	29/29	36/36	35/35	36/36	35/35	35/36	30/30	34/34	26/28	35/36	32/32	34/34	35/35	32/33	29/29	22/23	20/21
Settleable Solids[2] (ml/L)																	
North Outfall	19/19	34/35	34/35	32/35	31/34	34/36	30/30	34/36	29/29	32/36	32/32	34/34	33/35	32/34	22/22	n/a	n/a
West Outfall	19/19	32/36	34/34	35/36	34/34	35/36	29/30	36/36	27/28	36/36	31/32	34/34	32/35	33/33	22/22	n/a	n/a
TSS (mg/L)																	
North Outfall	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6/6	24/24	24/24
West Outfall	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5/6	24/24	24/24
Maverick Street Outfall	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4/6	22/24	20/21
pH																	
North Outfall	34/35	33/36	35/35	35/35	35/35	36/36	30/30	36/36	29/29	36/36	32/32	34/34	35/35	34/34	26/26	12/12	16/16
West Outfall	34/34	28/36	33/34	35/36	35/35	36/36	30/30	36/36	29/29	36/36	32/32	34/34	35/35	33/33	26/26	12/12	16/16
Porter Street Outfall	35/35	30/36	34/34	36/36	35/35	36/36	30/30	36/36	28/28	36/36	32/32	34/34	35/35	33/33	22/22	21/21	48/48
Maverick Street Outfall	35/35	35/36	35/35	36/36	34/35	36/36	30/30	35/35	28/28	36/36	32/32	34/34	35/35	33/33	26/26	10/10	16/16

Notes: Sampling requirements changed in 2007 with the issuance of a new NPDES permit. Results through 2007 are based on NPDES Permit MA0000787, issued March 1, 1978. Stormwater outfall water quality monitoring results collected in accordance with the requirements of former NPDES permit. A portion of the Porter Street Drainage Area was incorporated into the West Drainage Area as part of roadway construction projects at Logan Airport.

1 In 2001 and 2003, exceptional weather, tidal conditions, or insufficient discharge precluded the collection of some samples, leading to a fewer number of samples collected than in other years.

2 Settleable solids analyses were replaced with TSS in 2008.

Table J-15 History of Logan Airport Oil and Hazardous Material Spills[1] and Jet Fuel Handling - 1990 to 2009

Year	Total Number of all Spills	Total Number of all Spills >10 gallons	Total Volume of all Spills (Gallons)	Estimated Volume of Jet Fuel Handled (Gallons)	Total Volume of Jet Fuel Spilled (Gallons)
1990	173	NA	NA	438,100,000	3,745
1991	186	NA	NA	NA	2,471
1992	195	NA	NA	NA	4,355
1993	188	NA	NA	451,900,000	3,131
1994	217	NA	NA	476,700,000	4,046
1995	161	NA	NA	309,200,000	21,412[2]
1996	159	NA	NA	346,700,000	1,321
1997	147	NA	NA	377,488,161	2,029[3]
1998	191	NA	NA	387,224,004	10,047[4]
1999	196	43	7,151	425,937,051	7,012[5]
2000	136	20	1,318	441,901,932	1,227
2001	139	37	1,924	416,748,819	1,771
2002	101	16	653	358,190,362	559
2003	128	19	10,364	319,439,910	10,188[6]
2004	126	18	894	373,996,141	574
2005	97	15	2,319	368,645,932	585
2006	92	11	752	364,450,864	644
2007	108	7	604	367,585,187	361
2008	99	20	944	345,631,788	662
2009	95	6	1004	327,358,619	915

Source: Massport Fire-Rescue Department.
NA Not available.
1 Materials include: jet fuel, hydraulic oil, diesel fuel, gasoline, and other materials such as glycol and paint.
2 One tenant spill, which occurred on October 15, 1995, totaled 18,000 gallons (84 percent of the annual spill total). The spill did not enter the Airport's storm drain system.
3 On October 23, 1997, a fuel line on an aircraft failed, resulting in the release of approximately 2,500 gallons, all but 60 gallons of which were recovered in drums before reaching the ground. Only the 60 gallons is included in the 1997 total.
4 Includes a 7,200-gallon spill that was discovered on September 2, 1998, and a 1,300-gallon spill that occurred on June 3, 1998. Neither spill entered the Airport's storm drain system.
5 Includes a 5,000-gallon spill, none of which entered the Airport's storm drainage system.
6 In 2003, one fuel spill comprised 9,460 gallons or 94 percent of the total volume of the MA DEP/MCP reportable spills that year. The fuel spill was contained and did not enter the drainage system.

Table J-16 Type and Quantity of Oil and Hazardous Material Spills at Logan Airport - 1999 to 2009

	Jet Fuel			Hydraulic Oil			Diesel Fuel			Gasoline			Other		
Year	No. of Spills	Quantity (Gallons)	No. of Spills ≥10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥10 Gallons
1999	151	7,012	40	24	67	1	13	49	2	5	7	0	3	16	0
2000	115	1,227	18	8	59	2	3	11	0	8	16	0	2	5	0
2001	104	1,771	32	21	92	3	5	30	1	6	26	1	3	5	0
2002	79	559	15	7	38	0	8	37	1	4	8	0	3	11	0
2003	89	10,188	15	15	91	3	15	30	0	7	24	0	2	31	1
2004	82	574	12	17	189	4	14	52	0	7	26	0	6[1]	53[2]	2[3]
2005	66	585	12	14	78	1	7	1,610	2	7	45	0	3[4]	1	0
2006	65	644	9	10	25	0	6	57	1	4	9	0	7	17	1
2007	66	361	4	16	37	0	16	57	1	3	8	0	7	141[5]	2
2008	74	662	19	15	56	2	5	14	0	1	7	0	4	205[6]	1
2009	95	915	6	21	51	0	9	20	0	3	3	0	11	15	0

Notes:

1 Includes two Unknown spills (14 gallons), plus one spill of each of the following: Ethylene Glycol, Propylene Glycol, AVGAS, and Paint.
2 Ethylene Glycol (25 gallons), Propylene Glycol (10 gallons), AVGAS (1 gallon) and Paint (3 gallons).
3 One spill of Ethylene Glycol; one spill of Propylene Glycol.
4 Includes two spills of an unknown substance and volume.
5 Includes one spill of motor oil (4 gallons); one spill of kerosene (5 gallons); one spill of cooking oil (120 gallons); one spill of fuel oil (10 gallons); one spill from a battery (1 gallon); two spills of an unknown substance (1 gallon).
6 Includes one spill of transformer oil (200 gallons).

Capital Programs and Environmental Affairs

EnviroNews

A Massport Tenant Newsletter

Volume 35, Issue 1

February 2009

INSIDE THIS ISSUE:

EnviroNews is a newsletter published quarterly for Massport Tenants. Your comments and suggestions are welcome—please contact either:
Katie Choe
(kchoe@massport.com) or
Tricia Haederle
(phaederle@massport.com

$400,000 Grant to Benefit Fish Pier Tenants

The United States EPA announced on February 26, 2009 that Massport will receive $400,000 through the North East Diesel Collaborative Emission Reduction Grant Program to install dock-side power at the Fish Pier. "Shore power" allows vessels to "plug in" to an electrical power source instead of using diesel generators while at the berth. Currently, shore power is available to only four vessels when docked at the Fish Pier. More than a dozen vessels regularly dock there, and need to run their diesel generators many hours per day to supply power for off-loading, maintenance and essential on-board systems. The project is expected to reduce diesel generator idling by 95 percent.

Boston Fish Pier

"We are pleased to partner with the EPA on this program that will reduce the impact of our port operations and help us be more environmentally friendly," said Michael A. Leone, Massport's Port Director. "The grant will significantly reduce diesel emissions, and allow fishermen to conduct their business in a more energy efficient and cost effective manner." Massport anticipates completing the installations this year.

Trench Excavations on Massport Property Require Tenants to obtain Permits Beginning March 1, 2009

Beginning March 1, a permit must be obtained for trench excavations on all Massport property, with few exceptions. This is in response to the new Massachusetts Department of Public Safety regulation for trenches, to ensure that unattended trenches do not pose a safety hazard.

Massport will require that a permit be obtained before work starts, and excavators will be required to meet safety standards to prevent trenches from being accidentally accessed. A permit will be required for excavations that are greater than three feet in depth.

Massport's Capital Programs and Environmental Affairs Department will issue the trench permits. For more information, or to obtain a permit application, contact Ernie Silva, Manager of Construction Operations and Logistics at 617-561-3392 or via e-mail at esilva@massport.com.

Green Fuel Takes Flight

On January 7, 2009, Continental Airlines demonstrated the use of a sustainable aviation biofuel during a two-hour test flight originating from Houston's Bush Intercontinental Airport.

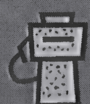
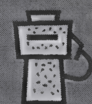
This flight, the first to use biofuel in a commercial aircraft in North America, was conducted in partnership with Boeing, GE Aviation/CFM International, Honeywell's UOP, Sapphire Energy, and Terasol Energy. The Boeing 737-800 aircraft, carrying no passengers, was fueled with a 50% mix of biofuel made of algae oil and jatropha oil and traditional jet fuel.

Both algae and jatropha plants are sustainable and do not impact food crops, water resources, or contribute to deforestation. The biofuel requires no modifications to the aircraft and meets or exceeds all specifications necessary for jet fuel.

Source: Continental Airlines

What are Biofuels?

Liquid or gas composed of flammable hydrocarbons derived from plant or animal materials. Biofuels are produced from recently dead organic materials, compared to *fossil fuels*, such as oil and natural gas, which are formed from ancient plant and animal materials.

Stormwater Permitting Reminders

Stormwater runoff from rainfall and snowmelt in regulated by both the Massachusetts DEP and the US EPA. Improperly managed stormwater may have a significant effect on the environment by increasing discharge rates and volumes, reducing groundwater and wetland recharge, and increasing wetland pollution.

All stormwater runoff of Massport properties must be managed according to the DEP's Stormwater Management Standards and if development of construction is scheduled to take place within 100 feet of a wetland a Notice of Intent must be filed with the DEP.

(continued next page)

Anti-Idling Law Applies to All Massachusetts Drivers

Five minutes. That is the period of time that Massachusetts General Law permits operators of vehicles to idle their engines while stopped, unless the engine is essential to the vehicle's servicing or operation, or for delivery of goods.

For most of us, that means warming your car up on a frosty morning for longer than five minutes can leave you vulnerable, not just to increased air pollution, but to a ticket from the police or your local health official. And the ticket can carry a fine, up to $25,000.

And it is not just state and local authorities looking out for violations. The United States Environmental Protection Agency also imposes penalties. For example, Allied Waste Services of New England was recently fined $195,000 by the EPA, for diesel trucks idling excessively at four Massachusetts locations. And if you need one more reason to stop idling, according to the Boston Globe (1/29/09), Boston police are seeing an "alarming" increase of thefts of unattended idling cars.

Idle Facts

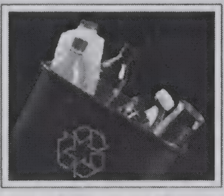
Every gallon of gas you use produces about 19 pounds of carbon dioxide.

Idling your vehicle for just 10 minutes can use as much fuel as it takes to travel 5 miles.

Idling is linked to increases in asthma, allergies, heart and lung disease and cancer.

A savings of $475-950 per year, per vehicle, can be realized by cutting idling by 1 hour per day (assumes diesel cost $3.18/gallon)

Sources: www.makealeap.org and www.epa.gov/cleandiesel



Massport Recycles A Record 62 Tons of Trash in Three Months

Massport's recycling efforts diverted 62 tons of trash from landfills between August and October 2008. The top recycling locations, Logan Office Center and Terminal A, both diverted approximately 30% of their trash to recycling facilities in this time period and the two newest recycling locations, Conley Terminal and Tobin Bridge, diverted 14% and 4% respectively.

In addition to these locations, Massport has recycling programs established at other portions of Logan Airport, Logan Office Center, Tobin Bridge, Conley Terminal, Hanscom Field, Fish Pier, Bremen Street Park, Piers Park, South Boston Maritime Park, Festa Field, and in many of our tenants' offices, including the latest addition, Servisair in Terminal E. Capital Programs will roll out new recycling programs at the four Logan Express sites and Logan Badge Office this spring.

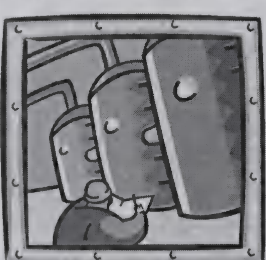
Massport's recycling program accepts any clean and non-waxed paper, cardboard, any plastic marked numbers 1-6 except plastic bags, aluminum, clear glass, colored glass, e-waste, rechargeable batteries, florescent bulbs, and scrap metal.

If you have any questions, want to participate more actively in your existing recycling program, or want to start a recycling program in your Massport location, contact Katie Choe, Massport's Sustainability Manager, at x5946 or kchoe@massport.com.

New Changes to Massachusetts Storage Tank Requirements May Affect Massport Tenants

The Massachusetts Board of Fire Prevention Regulations (527 CMR 9) have recently been updated to include new requirements for inspection of underground storage tanks (USTs).

Among other items, UST owners are required to fund inspections by independent tank inspectors every three years. The deadline for the first inspection is August 2010. There are also additional requirements for proof of financial responsibility.

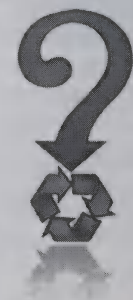


If you have any questions about the new storage tank requirements, please contact Erik Bankey, Senior Environmental Project Manager at Massport, at 617-568-3514 by e-mail at ebankey@massport.com

Stormwater , cont'd.

Work within certain industrial sectors also must meet the EPA's Multi-Sector General Permitting Requirements

If you have a question about the stormwater permitting requirements or their applicability to your project, contact Jim Stolecki in Environmental Management Unit at (617) 568-3552 or jstolecki@massport.com.



Did You Know?

A single quart of motor oil, if disposed of improperly, can contaminate up to 2,000,000 gallons of fresh water.

On average, it costs Massport $30 per ton to recycle trash, $80 to send it to the landfill, and $140 to incinerate it.

Recycling one aluminum can saves enough energy to run a TV for three hours -- or the equivalent of a half a gallon of gasoline.

Each ton (2000 pounds) of recycled paper can save 17 trees, 380 gallons of oil, three cubic yards of landfill space, 4000 kilowatts of energy, and 7000 gallons of water. This represents a 64% energy savings, a 58% water savings, and 60 pounds less of air pollution!

Sources: www.recycling-revolution.com and Massport

Beat Those Economic Blues: Take Advantage of Environmentally-Friendly (& Free) Commuter Perks

Free Cash and Transportation Top the List of Benefits

Discounted Zipcar rentals. Monthly drawings for free gift cards or other great swag. Guaranteed rides home. These benefits and more are available to Massport's tenant employees through the Logan and Seaport Transportation Management Associations (TMAs).

Founded in the 1990's to assist commuters in securing more environmentally efficient transportation to work, these two TMAs provide many free services to employees of Massport, many of Logan's airlines and concessionaires, and businesses based on the South Boston Waterfront.

By using mass transit, such as the T, carpooling, or walking to work, you can personally play a role in reducing engine exhaust, reducing air pollution and limiting your impact on global warming.

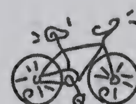
In addition to reducing your environmental footprint, you can improve your health at the same time. Remember those New Year's Resolutions to stay in shape? The Seaport TMA's "Workout to Work", "Bicycle Buddy" and "Bicycle Commuter" programs allow you to log your miles walked or biked to win prizes, all while reaping the fitness benefits.

Worried about getting stuck at work in an emergency or because of illness, and not having immediate access to your car? TMAs have a solution for that as well. Their ride home programs will reimburse you for the taxi fare to get back to your car several times a year. Restrictions do apply, so be sure to check with the TMA on eligibility.

If you currently drive to work alone, and are unsure if you want to make the commitment to take public transportation, try Logan's "Commuter Cash" or Seaport's "Try Transit on Us". They allow you to earn up to $180 dollars just for giving mass transit a three month try (be sure to sign up in advance for these programs as space is limited).

Another discount that you can take advantage of without registering for is the Logan East Boston Sunrise Shuttle (for $1 per ride, employees can catch a bus from East Boston to Logan between 3:00 and 5:30 am) .

If you have any questions about these fantastic programs, contact the TMA directly. Be aware that many of these programs do require advance enrollment to take advantage of benefits.



FOR MORE INFORMATION

Seaport Transportation Management Association
617.385.5510
www.seaporttma.org

Logan
Transportation Management Association
1.888.426.6688
www.commute.com
or

Visit the Employee Transportation Store
Logan Terminal C (lower level)
Fridays, 9 am-noon.

Capital Programs and Environmental Affairs

EnviroNews

A Massport Tenant Newsletter

massport

Volume 35, Issue 2

June 2009

INSIDE THIS ISSUE:

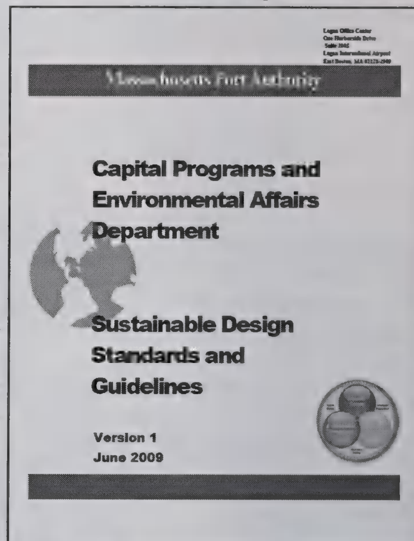
EnviroNews is a newsletter published quarterly for Massport Tenants. Your comments and suggestions are welcome—please contact either:
Katie Choe
(kchoe@massport.com)
or
Tricia Haederle
(phaederle@massport.com)

Landscaping with trees can reduce air conditioning costs by up to 50% by shading the windows and walls of a home.
– American Public Power Association

One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people.
– U.S. Department of Agriculture

Massport Unveils Sustainable Design Standards

Massport's Capital Programs and Environmental Affairs Department has developed Sustainable Design Standards outlining sustainable elements with proven environmental, social, or economic development benefits in the following categories: air emissions, building materials, energy management and efficiency, indoor air quality, site development and location, and water management and efficiency. As of June 12, 2009, all Massport capital projects will be rated according to sustainable elements incorporated into their design.



Massachusetts Port Authority

Capital Programs and Environmental Affairs Department

Sustainable Design Standards and Guidelines

Version 1
June 2009

The design standards were developed by an interdepartmental working group formed with the goal of developing Massport-wide Sustainable Design Standards and Documentation System that would result in the most sustainable projects possible for all capital improvement projects undertaken by Massport. The Massport Standards are more widely applicable than existing third-party verification systems and are tailored to Massport's operations, facilities, and geography. They are not intended to supplant LEED® or other third-party verifications where applicable but rather to ensure Massport's leadership in sustainable development for all of its projects and properties. The Standards were drafted to allow and encourage innovation and incorporation of new technologies wherever possible rather than be prescriptive with solutions.

The working group that developed the guidelines consisted of individuals from Capital Programs, Environmental Management, Utilities Management, Aviation, Maritime, and Economic Planning and Development, with the assistance of an outside consultant. These individuals are experts in sustainable design techniques, horizontal, vertical, and rehabilitation design and construction, airports, port construction and operations, bridge construction and operations, private development, project permitting, and commercial interiors.

For questions or a copy of the new design standards, contact Massport's Sustainability Program Manager, Katie Choe at (617)568-5946 or kchoe@massport.com, or Tricia Haederle, at 617-568-5963 or phaederle@massport.com.

Banned in Massachusetts: Waste Not?

Since 1999, waste bans, a series of regulations prohibiting the disposal of certain hazardous and recyclable items, have been in effect at solid waste facilities in Massachusetts. According to the Massachusetts Department of Environmental Protection (MADEP), the goals of the waste bans are to conserve capacity at existing solid waste disposal facilities, minimize the need for construction of new facilities, and to support the recycling industry by ensuring that large volumes of material are available on a consistent basis. Right now this regulation is enforced by MADEP at the solid waste transfer facilities, when DEP inspects the loads coming into the facility. For more information on the waste ban and how to dispose of banned materials, go to the MADEP web page at http://www.mass.gov/dep/recycle/solid/regs0201.htm.

SUMMARY OF ITEMS INCLUDED IN MASSACHUSETTS WASTE BAN

Recyclable Paper: All paper, cardboard, and paperboard products (EXCEPT tissue paper, toweling, paper plates and cups, wax-coated cardboard and other low-grade paper products).

Glass Containers: Glass bottles and jars. The ban does not cover light bulbs, Pyrex cookware, plate glass, drinking glasses, windows, windshields and ceramics.

Metal Containers: Aluminum, steel or bimetal beverage and food containers.

Single Resin Narrow-Necked Plastics: A soda bottle is narrow-necked but a yogurt container is not.

Leaves & Yard Waste: Leaves, grass clippings, weeds, garden materials, shrub trimmings, and brush one-inch or less in diameter (excluding diseased plants).

Batteries: Lead-acid batteries used in motor vehicles or stationary applications

Miscellaneous Items: white goods, whole tires, cathode ray tubes, brick, concrete, metal and wood

Source:www.mass.gov/dep/recycle.

EPA Issues $89,500 Fine for Improper Labeling, Spill Prevention

(Boston, Mass. – May 28, 2009) – The U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.H. will pay $89,500 for violations of federal and state hazardous waste management laws.

Following an EPA inspection in 2007, EPA alleged that the facility failed to determine whether numerous containers held hazardous wastes and failed to properly label hazardous wastes containers. Additionally, EPA alleged that the facility accumulated hazardous waste in an area with a floor drain without taking measures to prevent a leak or spill. The facility is currently in compliance with these RCRA requirements.

An example of properly labeled drums.

Hazardous waste generators must fully evaluate and disclose their waste streams so that proper decisions can be made on how to handle such materials. Conducting hazardous waste determinations and properly labeling containers allows facilities and regulators to safely handle the chemical wastes that are generated, used and stored within a particular facility.

The Cold Regions Laboratory conducts research on the impacts of human activity on the environment in cold regions, as well as the cold effects on construction operations and the maintenance of facilities. The facility generates laboratory chemical wastes through these processes.

For more information, go to: www.epa.gov/region1/enforcement/waste/index.html.

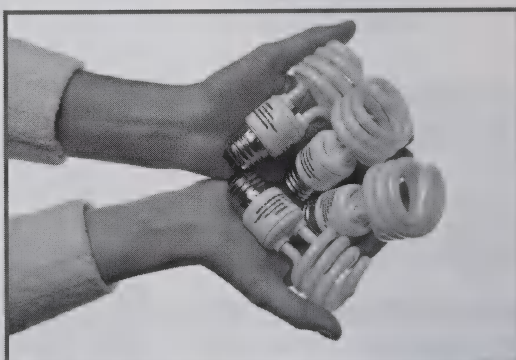
Spotlight: Fluorescent Lamps & Mercury

Here's the catch-22 with those environmentally friendly compact fluorescent lightbulbs (CFLs): they use 75% less electricity and last ten times longer than incandescent bulbs, but they contain mercury, a toxin, and sometimes lead, which is why they can't be thrown out with the trash...

In 1999, the United States Environmental Protection Agency issued the final Universal Waste Rule, which governs, among other items, the disposal of fluorescent and high intensity discharge (HID) lamps (the term "lamp" refers to the bulb or tube portion of a light bulb—the part which contains mercury). These federal regulations, along with the 2006 Massachusetts Mercury Management Act prohibits the disposal of all mercury-containing items in the trash. Currently, all mercury containing lamps must be recycled or managed as hazardous waste in Massachusetts. This includes standard linear, U-style and circular fluorescents, compact fluorescent lamps (CFL) , lamps with green end caps or green marking, compact fluorescents, high intensity discharge, mercury vapor, neon and high-pressure sodium lamps used in outdoor lighting.

Why is mercury a problem?

Mercury is toxic to the human nervous system, kidneys, liver and immune system. When inhaled or ingested, it can cause a range of physical symptoms. Mercury that is released to the environment "bioaccumulates" in fish – that is, it builds up in their tissue over time – making them less healthful or even dangerous to eat.



When fluorescent lamps are broken, burned in a waste-to-energy plant, or buried in a landfill, mercury can be released into air. While air pollution equipment at waste-to-energy plants can capture over 90 percent of the mercury released at these facilities, the remainder is released into air, as is most of the mercury released by landfills and by bulbs that are broken in uncontrolled settings.

What are the risks of mercury exposure from handling lamps?

Mercury lamps only pose a hazard when they break. When they are handled properly to minimize breakage, there is little chance of mercury exposure. In fact, an active lamp recycling program can reduce the likelihood of an accidental mercury release by stressing the importance of handling lamps carefully.

Are there specific rules for handling spent and broken lamps?

To minimize the potential for mercury releases from broken fluorescent lamps, the Massachusetts Department of Environmental Protection (MassDEP) requires that all lamps be accumulated, stored, transported and disposed of as hazardous wastes, under the *Massachusetts Hazardous Waste Management Act* and the federal *Resource Conservation*

(Continued on page 4)

Fluorescent Lamps & Mercury

(Continued from page 3)

and Recovery Act (RCRA).

Fluorescent lamps may be recycled under the streamlined provisions of the *Universal Waste Rule* (found at 310 CMR 30.1000), which MassDEP adopted to encourage the recycling of products with specific toxic or hazardous constituents. To recycle fluorescent lamps, you must:

- Store unbroken lamps in a box or fiber drum to prevent breakage, and keep that container in a secure, protected area. If possible the storage container should be closed between uses and stored in a ventilated area that is not consistently occupied, in case the lamps break during storage.
- Label the container *Universal Waste – Spent Fluorescent Lamps* and mark it with the date on which you first began storing the lamps.
- Have these lamps collected by, or delivered to, an authorized lamp recycler, hazardous waste transporter or another universal waste handler within one year of the date marked on the container.

What do I do if a lamp breaks?

Never use a vacuum cleaner, which will only disperse the mercury over a wider area. If a lamp breaks in the universal waste storage container, do not empty the container; rather, have the container collected by or delivered to an authorized waste handler as soon as possible. If a lamp breaks outside of the universal waste container, see specific cleanup guidance at: http://www.mass.gov/dep/toxics/stypes/hgres.htm#dispose

How can I dispose of spent or broken fluorescent lamps?

A complete list of mercury recyclers can be found at: http://www.lamprecycle.org/

Article sources: MADEP and USEPA.

Sources of Information & Assistance

General information about mercury: MassDEP Mercury Hotline toll-free at 866- 9-MERCURY (866-963-7287) or http://www.mass.gov/dep/toxics/stypes/hgres.htm

Health effects of mercury: Department of Public Health at 617-624-5757 or http://www.mass.gov/dph/topics/mercury.htm

Universal Waste Rule fact sheet: MassDEP Business Compliance Assistance Line at 617-292-5898 or http://www.mass.gov/dep/recycle/compliance/factguid.htm#universal

USEPA Mercury Containing Light Bulb (lamp) Recycling: http://www.epa.gov/epawaste/hazard/wastetypes/universal/lamps/index.htm

Did You Know?

The first Compact Fluorescent Lightbulb (CFL) was invented in 1975 and now resides in the Smithsonian National Museum of American History.

~CONSUMERREPORTS.ORG

Due to the their inefficient use of energy, incandescent bulbs will be banned by Congress, starting in 2012, with a complete phase out by 2014; even existing halogen bulbs will not make Congress' new mandate to make all bulbs 70 percent more efficient by 2020.

~EARTH911.ORG

Nationwide, over 670 million mercury-containing bulbs are discarded each year. Approximately 23% of those were recycled in 2003. In 2004, 70.8% of the mercury-lamps used by business and 98% of the lamps used in homes were not being recycled.

~EPA.GOV & LAMPRECYCLE.ORG

Virtually all components of a CFL or other fluorescent light bulb can be recycled. The metal end caps, glass tubing, mercury and phosphor powder can all be separated and reused. Recyclers often sell the metallic portions as scrap metal. The recycled glass can be remanufactured into other glass products. The mercury can be recycled into new fluorescent light bulbs and other mercury-containing devices.

~EPA.ORG

Capital Programs and Environmental Affairs

EnviroNews

A Massport Tenant Newsletter

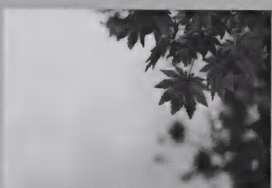
massport

Volume 35, Issue 3

October 2009

INSIDE THIS ISSUE:

EnviroNews is a newsletter published quarterly for Massport Tenants. Your comments and suggestions are welcome—please contact Tricia Haederle



~FALL GREEN TIPS~

Compost is a rich, organic soil conditioner for your lawn and garden. Put raked leaves and other yard wastes in a compost bin and keep these materials out o landfills. Don't forget to add any organic materials cleaned out of gutters as well.

Why purchase a Halloween costume that you will probably only use once and then throw away? Instead, use old clothes or buy used clothes from a consignment shop to make your costume. Also remember to use reusable cloth bags instead of disposable ones for trick-or-treating. (www.epa.gov)

Fishing For Energy

Fishing for Energy has caught on in Massachusetts. Boston will be the latest port in the state to land the innovative partnership that provides a cost-free solution for fishermen to dispose of old fishing gear that is subsequently converted into clean, renewable energy at a Covanta Energy-from-Waste facility.

An initiative among Covanta Energy (Covanta), the National Fish and WildlifeFoundation (NFWF), the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, and Schnitzer Steel Industries, Inc., the Fishing for Energy partnership with the help of Massachusetts Port Authority (Massport) will place collection bins at Boston Fish Pier to collect old, abandoned or lost fishing gear. Discarded fishing equipment such as nets, line pots and buoys can threaten marine life, impact navigational safety, and have economic repercussions on the fishing and shipping industries and, most importantly, coastal communities.

"The Fishing for Energy program benefits both our fishermen and the marine environment," said Mike Leone, Massport's Port Director. "This collaborative program provides

(Continued on page 3)

October is National Fire Safety Month

Every year, over 5,000 Americans die in fires and 25,000 are injured. Most of us know the escape routes in our homes, but what about the work place? If someone were to ask you where the closest fire extinguisher to your office was, would you be able to answer? How about your escape routes and rally points? **This month, take a moment to familiarize yourself with the locations of these items in your work space:**

- Emergency stairwells (never use elevators during an alarm)
- Department meeting points during an evacuation
- Fire Extinguishers
- Fire Alarm Pull Stations

Also take note of fellow employees who may need extra assistance during an evacuation, and lend a hand if needed.

Smoke Gets In Your Eyes (and lungs, and house, and...)

Fall brings the wood burning season—time to get ready to light those fireplaces and wood stoves. But not so fast: Did you know that by changing the way your burn wood, you can save money, reduce air pollution and protect your health?

In the fall and winter, wood burning is the primary contributor to air pollution. In some areas of the country, almost half of the air pollution (in the form of particulate matter) is from wood burning fireplaces. Particulate matter can exacerbate breathing problems for those with asthma and other respiratory or cardiac problems.

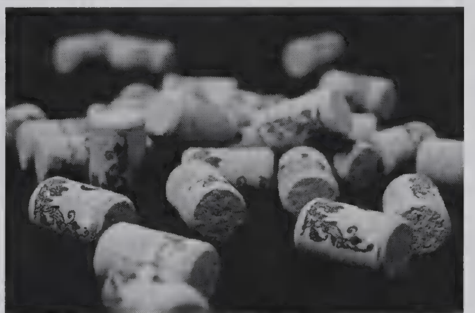
So how does air pollution from fires stack up against those from other sources? If you were to compare the amount of particulate matter generated by a new, 300 horsepower diesel truck to that generated by a fireplace, the fireplace would produce three times as much soot as the diesel truck. Even natural gas or propane space heaters produce less particulate pollution: one woodstove produces the equivalent pollution of 3,000 gas furnaces each producing the same amount of heat.

To reduce the particulate pollution related to wood burning fires, the USEPA recommends the following :

- Use seasoned fire wood (seasoned at least 6 months). It will burn hotter and reduces the amount of smoke produced.
- Use hardwoods—never burn trash or treated wood.
- Don't let the fire smolder overnight. It does little to produce heat and increases air pollution.
- Keep your chimney clean—inspect once a year.
- Upgrade to cleaner equipment. EPA-certified wood stoves, inserts and boilers are cleaner burning and emit less particle pollution than older models.

Article Sources: WWW.EPA.GOV/WOODSTOVES and the California Air Resources Board

American Airlines ReCORKS



American Airlines has teamed up with Sodexho and ReCORK America to recycle wine corks in their Admirals Club locations (including Boston). More than 13 billion natural cork wine stoppers are produced worldwide for the wine industry each year. This new initiative will recycle natural wine corks used by the clubs (or brought into the clubs by customers) by donating them to ReCORK America. In turn, ReCORK America will send them to manufacturers that can turn them into items such as shoe soles or flooring.

"We are pleased to work with ReCORK America to recycle and reuse products that would normally be thrown away," said Nancy Knipp, President - Admirals Club. "Even small items such as wine corks, when recycled, can make a big difference to our environment."

"Natural cork wine closures are ideal for recycling because they are a truly sustainable resource, and one of the few forms of product packaging that is 100 percent recyclable, biodegradable and completely environmentally friendly," said Roger Archey, Spokesperson - ReCORK America. "Cork is also a natural retainer of CO_2 and helps fight global warming."

Did You Know? Energy Fast Facts

- Energy released by burning one wooden match: **1 BTU**. Total energy used in the US each year: **99.98 quadrillion BTUs**.
- America spends **almost $4 billion annually on electricity lost** to "vampire power," according to the International Energy Agency. Vampire power, also known as "phantom load," is the electricity that electronics and appliances use while they are turned off or in standby mode.
- **86%**: total US energy production from fossil fuel combustion.
- **19 pounds**: approximate carbon dioxide emissions from one gallon of gasoline.
- In the winter, turn your thermostat down to 68 degrees or below. Reduce the setting to 55 degrees at the end of the day. **For each 1 degree you turn down the thermostat in the winter, you'll save up to 5 percent on your heating costs.**

(Continued from page 1)

a financial incentive and creates a beneficial use of old and abandoned fishing gear, and until now the fishermen themselves have assumed the burden of getting rid of it. Massport is thrilled to be able to provide space for this important effort." Gear collected at the Fish Pier will be converted into renewable electricity that will ultimately be used by Massachusetts homes and businesses.

The Fishing for Energy partnership depends on extensive cooperation between local organizations and the fishing community. In Boston, Massport is working collaboratively with the partnership to inform the Boston fishing community of the new no-cost disposal option and place a convenient collection bin at the Fish Pier. These efforts make the marine debris removal successful by eliminating financial cost to fisherman that would otherwise be incurred to dispose of gear and ensuring that derelict gear does not end up in the marine environment.

Since launching in 2008, the Fishing for Energy partnership has reeled in more than 200 tons of old fishing gear, a portion of which has been retrieved directly from the ocean by fishermen. This year the partnership has expanded to work with ports on both the east and west coasts of the United States, hosting a series of launch events which aim to promote retired or derelict fishing gear collection through community education and outreach. For more information on the partnership visit: www.nfwf.org/fishingforenergy.

Source: PRNewswire

Announcements

Massport's Capital Programs Department welcomes **Jacki Wilkins** as acting Sustainability Manager, responsible the implementation of the Agency's Sustainable Design Guidelines, oversight of ISO 14001 certifications and recycling programs. Jacki takes over for **Katie Choe**, who moved into the position of acting Assistant Director, Capital Programs & Project Controls, vacated by **Bob Whittaker** when he retired in September. Jacki can be reached at 617.568. 3558, or jwilkins@massport.com.

Massport was awarded the **American Association of Port Authorities 2009 Comprehensive Environmental Management Award** for it's "Sustainable Design Standards and Guidelines," which features a certification program comprising a set of standards and guidelines required to be used by all of the port's planners, architects and engineers in developing non-structural projects, such as marine terminals.

Capital Programs and Environmental Affairs

EnviroNews

A Massport Tenant Newsletter

Volume 35, Issue 4

Dec. 2009/Jan. 2010

INSIDE THIS ISSUE:

EnviroNews is a newsletter published quarterly for Massport Tenants. Your comments and suggestions are welcome—please contact Tricia Haederle (phaederle@massport.com) at 617.568.5963.

Winter Wise Tip from USEPA

Consider using non-toxic deicing substances, such as clean cat litter or sand. Chemical deicers can be hazardous to pets, wildlife and vegetation. In addition, chemicals can contaminate ground water and drinking water by seeping through the soil.

Massport Greening It's Stockroom

If you walked through Massport's Central Stockroom, you'd notice shelves of materials marked "Green Product", cases of recycled paper products and rows of biodegradable cleaners. Jim Tower, Supervisor of the Central Stockroom, is proud to point to the many green products that over the past few years he and others have tested and substituted for less environmentally-friendly ones.

Massport's Central Stockroom Green Team: Crista Forero, Jim Tower, Bill Wieners, James Heckley and Richard Bartlett.

Jim and his coworkers are constantly evaluating new green products. "We look at everything," says Facilities Administrative Manager Bill Wieners, who oversees the Central Stockroom. These changes have likely gone unnoticed during Massport's daily operations.

(Continued on page 4)

Fish Pier Tenants Recycle a Bus

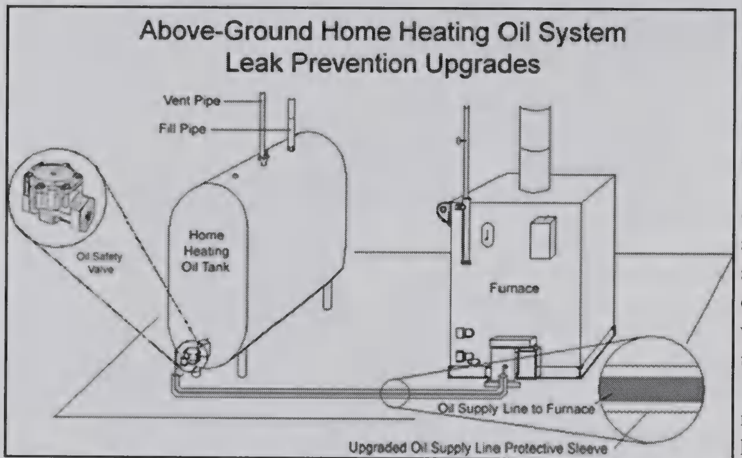
Well, not a bus, but it's equivalent weight. After Massport switched to single stream recycling at the Fish Pier in August 2009, approximately eleven tons (22,000 pounds) of recyclable materials had been diverted from trash as of December 31, 2009, amounting to about 5% of the Fish Pier's total annual trash volume. This is approximately the weight of an empty, thirty-eight foot long, eighty-four passenger school bus.

Single stream or comingled recycling permits glass, paper, plastic and metal to be disposed of in the same container, making it more efficient to recycle (no more sorting!). Congratulations to the Fish Pier tenants and Massport employees who continue to make this effort a success.

If you have any questions about Massport's recycling program, please do not hesitate to contact Jacki Wilkins, Acting Sustainability Manager, at jwilkins@massport.com or 617-568-3558.

Homeowner Oil Heating System Upgrade Required by July 1

Massachusetts has a new law to address oil leaks from home heating systems. This law has two major provisions that require the installation of either an oil safety valve or an oil supply line with protective sleeve on systems that do not currently have these devices and insurance companies that write homeowner policies to offer coverage for leaks from heating systems that use oil.



By July 1, 2010, owners of 1- to 4-unit residences that are heated with oil must upgrade their home heating system equipment to prevent leaks from tanks and pipes that connect to the furnace. By the July deadline, owners of these residences must already have or install an oil safety valve or an oil supply line with a protective sleeve, as shown in the diagram. The typical cost of installing either an oil safety valve or oil supply line with a protective sleeve ranges from $150 - $350 (including labor, parts, and local permit fees). It is important to note that heating oil systems installed on or after January 1, 1990 most likely are already in compliance because state fire codes implemented these requirements on new installations at that time.

Homeowners who take these preventive measures can avoid the disruption and expense that can be caused by heating oil leaks. A leak may result in exposure to petroleum vapors in your home. If the leak reaches the soil or groundwater beneath your house, then a cleanup must be performed to restore your property to state environmental standards. Leaks that affect another property or impact drinking water supply wells can complicate the cleanup and increase the expense. Each year, several hundred Massachusetts families experience some kind of leak. The cleanup cost for a "simple" heating oil leak can be as much as $15,000. In cases where the leak impacts the groundwater or is more extensive, the cleanup costs can reach $250,000 or more.

The cleanup cost for a "simple" heating oil leak can be as much as $15,000. In cases where the leak impacts the groundwater or is more extensive, the cleanup costs can reach $250,000 or more.

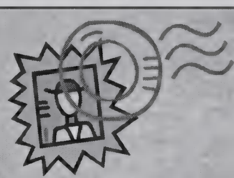
For more details on this new law, including the changes to insurance policies, please go to:

ttp://www.mass.gov/dep/cleanup/laws/hhsl.htm.

Source: MADEP

It's Catalog Season! Stop Junk Mail, Save a Forest

If you've ever had to wade through knee-deep piles of junk mail to answer the doorbell, you may have wondered why and how these advertisers have targeted you. Most likely, your name and personal information have found their way onto marketing lists that are sold and shared among companies eager to solicit you. Most consumers are unaware of the rights, services and resources available to protect them. The Massachusetts Office of Consumer Affairs and Business Regulation has compiled the following tips for combating junk mail, which can be found on their web site through www.mass.gov:

> **Did You Know?**
>
> 
>
> - The average person gets 1.5 personal letters and 10.8 pieces of junk mail weekly.
> - Each person will receive almost 560 pieces of junk mail this year. That's 4.5 million tons of junk mail!
> - 44% of all junk mail is thrown in the trash, unrecycled.
> - 100 million trees are used annually to produce junk mail.
>
> Source: www.nativeforest.org
>
> - Over 51 million metric tons of greenhouse gases are created each year by junk mail, the equivalent of nearly 85,000 international flights of a 747.
>
> Source: www.forestethics.org

- **Remove your name from national mailing lists.** To remove your name and address from most national lists, contact the Direct Marketing Association at www.dmachoice.org.
- **Contact the companies that send you junk mail.** Ask to be removed from their mailing lists.
- **Be alert and proactive.** When first subscribing to magazines or ordering from catalogues, demand that the companies not rent, sell, or trade information about you. Be aware of what information you send companies-in most cases, you are the biggest source of information about yourself.
- **Opt out of credit bureau mailing lists.** Credit reporting agencies allow businesses to prescreen your credit report to determine if they want to send you a credit card offer. You have the right to not have your credit report prescreened by other companies. The national credit bureaus have set up a toll-free number so that you may opt out of pre-approved credit card offers.

Source: Massachusetts Office of Consumer Affairs and Business Regulation

New TV? E-Cycle Your Old One

In 2007, Americans had accumulated 99 million TVs in storage and discarded nearly 27 million. Of the TVs discarded, approximately 18 percent were recycled. Old televisions contain lead, copper, steel and aluminum that can be recovered through recycling. The best option for any used electronics product is to donate it. However, since the switch to digital broadcasting, donating a TV may no longer be an option. When purchasing a new TV, ask the retailer if they will take and recycle your old set when they deliver your new one. Otherwise, many retailers will accept your old TV. For potential recycling locations near you, go to www.earth911.org.

Source: http://www.epa.gov/epawaste/partnerships/plugin/televisions.htm

Greening Stockroom, continued

(Continued from page 1)

What hasn't gone unnoticed, however, is the side benefit: cost savings. For example, Bill estimates that Massport has saved $50,000 annually by switching to a green toilet paper product. Another savings is the switch to thinner plastic trash can liners: this move reduces Massport's landfill waste by more than 35,000 pounds per year and saves the Authority over $17,000 annually in waste disposal fees and liner costs.

Green measures employed by Massport's Central Stockroom, in addition to recycling:

REDUCING

- Energy consumption by replacing lights with energy efficient models
- Paper used by initiating paperless procurement
- Chemicals stocked by moving to multi-purpose products
- Volume of paper products by switching from 2-ply to 1-ply
- Greenhouse gas emissions by using a hybrid vehicle

REUSING

- Tools in a tool sharing program
- Spill adsorbent material that can be used up to 10 times as compared to single use adsorbents

When asked about what initiative they are particularly proud of, James describes a change in deliveries as making the biggest impact: "It used to be that stock deliveries were made throughout the week to different terminals, to each of the cleaning vendors, creating multiple truck trips. By consolidating, and making the deliveries once a week directly from the stockroom to the vendors, the number of truck trips is reduced, and so are the associated greenhouse gas emissions. We are also better able to control our waste stream."

Of course there are other benefits too. Central Stockroom employee Richard Bartlett has credited the greening of the stockroom with changing his behavior off the job. "I recycle more at home now," says Richard.

In addition to constantly researching new products, the stockroom is looking forward to eventually going paperless with the E-Pro purchasing portal, to reduce their paper consumption even further.

Did You Know? Energy Consumption and Buildings

Commercial and residential buildings are major contributors to greenhouse gas emissions. Buildings consume 40% of the primary energy used annually in the United States, and 54% of the energy used annually in the Commonwealth of Massachusetts.

As of January 1, 2010, Massachusetts adopted the International Energy Conservation Code as the new state building code. This code increases energy efficiency requirements by 10% over the base code. It will be amended every three years to increase energy performance.

Zero Net Energy Buildings generate power on site, using renewable power resources, in a quantity equal to or exceeding the energy the building consumes.

Sources: Massachusetts Executive Office of Energy and Environmental Affairs and "Getting to Zero: the Final Report of the Massachusetts Zero Net Energy Buildings Task Force", March 2009.

K

2009 Peak Period Pricing Monitoring Report

BOSTON-LOGAN INTERNATIONAL AIRPORT MONITORING REPORT ON SCHEDULED AND NON-SCHEDULED FLIGHT ACTIVITY

Peak Period Surcharge Regulation 740 CMR 27:00: Massachusetts Port Authority

Report Number:	**007**
Monitoring Period:	**Feb. 2010 – Sept. 2010**
Report Issue Date:	**June 2010**

Note: This report reflects the Boston-Logan Airport flight activity monitoring under 740 CMR 27.03 Peak Period Surcharge Regulation on Aircraft Operations at Boston-Logan International Airport.

Findings: This report includes projected activity data for the Spring and Summer season, from February 2010 through September 2010. Current and projected near-term flight levels at Boston Logan are well below Logan's good weather (VFR) throughput of approximately 120 flights/hour. **As a result, average VFR delays are projected to be minimal and well below the 15 minutes threshold through September 2010.**

In the event demand conditions at the airport change significantly from the current projection, Massport will issue updates to this report.

Attachments

Table 1: Summary Overview of Peak Period Surcharge Program

Table 2: Summary Overview of Forecast Methodology

Table 3: Aircraft Operations at Logan Airport Projected through September 2010

Table 4: Projected Hourly Operations, Average Weekday of August 2010

Table 5: Forecast Logan Average Weekday Operations, February 2010 through September 2010

Massport Contact:

Mr. Flavio Leo
Manager of Aviation Planning
617-568-3528
fleo@massport.com

Table 1: Summary Overview of Peak Period Surcharge Program

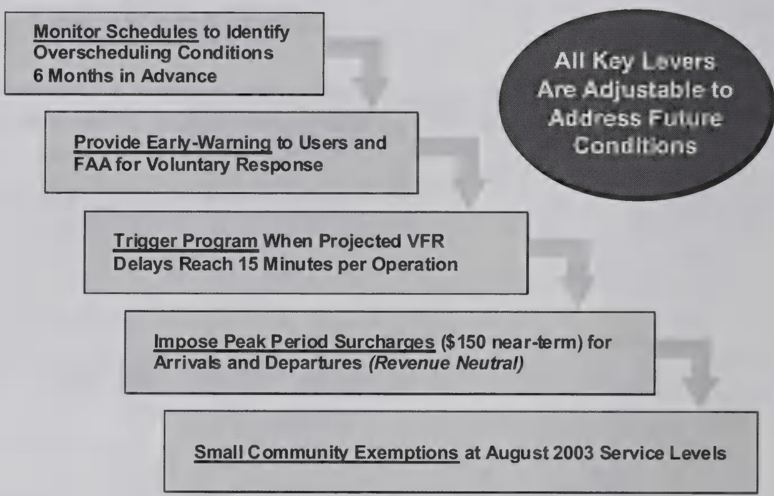


Table 2: Summary Overview of Forecast Methodology

- Scheduled passenger airline flights represent more than 93 percent of total aircraft operations. Passenger airline activity for the Spring and Summer periods were projected based on published advance airline schedules
- Forecasts of monthly activity for other segments (GA, Cargo, Charter) are based on the past three months of actual flight volume and historic patterns of monthly seasonality
- Day-of-week and time of day distributions for non-scheduled segments are based on analysis of Logan radar data
- Projections for each segment were combined to produce the forecast pattern of hourly flight activity for an average weekday, Saturday, and Sunday for the seven month period from February 2010 through September 2010

Table 3: Aircraft Operations at Logan Airport, *Average Weekday Operations Projected Through September 2010*

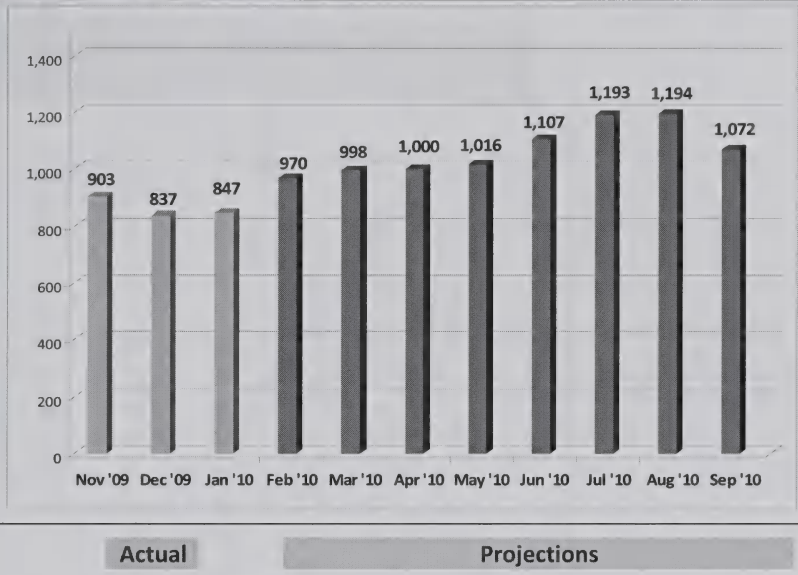
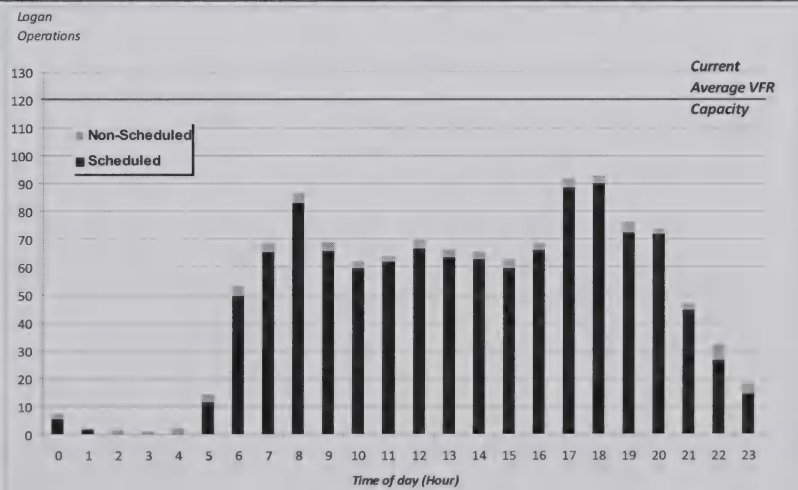


Table 4: Projected Hourly Operations, *Average Weekday, August, 2010*



Note: Includes projected services by scheduled airlines plus non-scheduled activity including general aviation, charter, and cargo operations.

Table 5: Forecast Logan Average Weekday Operations, *Feb. 2010– Sep. 2010*

	Forecast Daily Operations							
Hr Range	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10
0	8	6	10	10	8	7	7	8
1	2	2	2	2	3	3	2	1
2	1	1	2	2	2	2	2	2
3	1	1	1	1	1	1	1	1
4	2	2	2	2	2	2	2	2
5	14	15	13	11	15	16	14	12
6	45	48	50	50	53	54	53	50
7	62	61	62	63	64	71	68	64
8	70	74	71	66	77	83	86	79
9	58	57	58	63	63	68	69	66
10	52	55	51	53	57	61	62	56
11	48	51	54	51	58	62	64	60
12	48	48	44	51	57	70	70	53
13	51	52	58	67	69	67	66	58
14	45	47	52	52	60	65	65	60
15	53	53	54	48	53	63	63	53
16	69	69	62	67	67	68	68	60
17	81	81	78	84	87	89	91	88
18	73	76	86	77	83	91	93	86
19	63	67	67	68	75	77	76	72
20	42	45	40	46	63	75	74	55
21	29	31	30	34	39	46	47	41
22	34	35	34	30	33	33	32	26
23	19	21	18	17	19	19	18	17
Total	970	998	1,000	1,016	1,107	1,193	1,194	1,072

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Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations

A Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations

By Regina Clewlow, Hamsa Balakrishnan, Tom Reynolds, and R. John Hansman
Massachusetts Institute of Technology, Cambridge, MA 02139, USA

Aircraft taxi operations are a significant source of energy consumption and emissions at airports. In 2007, an estimated 4,000 tons of hydrocarbons, 8,000 tons of nitrogen oxides and 45,000 tons of carbon monoxide were emitted through taxi-out operations at U.S. airports[1]. These pollutants contribute to low-altitude emissions, directly impact local nonattainment of air pollution standards, and represent an endangerment to human health and welfare.

Given increasing fuel prices and concern about aviation-related environmental impacts, airlines have implemented a number of practices to reduce fuel burn during ground operations. Such strategies include minimizing use of the auxiliary power unit, controlling speed on the taxiway system, and reducing surface congestion and delays by holding aircraft at the gate. Researchers from the Massachusetts Institute of Technology's International Center for Air Transportation and the Partnership for AiR Transportation Noise and Emission Reduction conducted a survey of airline pilots at Boston Logan International Airport to assess their attitudes towards fuel conservation during taxi operations, and to document current fuel conservation practices, particularly single-engine taxi procedures.

This study found that the majority of pilots believe that fuel conservation is important; their motivation to conserve fuel is mainly driven by concerns about their airlines' economic viability, as well as the environmental impacts of aviation. The study also found that single-engine taxiing is quite prevalent in current operations, especially arrivals, and identified some of the practical challenges surrounding such procedures.

Survey of Pilots at BOS

With the cooperation of the Massachusetts Port Authority, MIT researchers conducted a web- and paper-based survey of pilots at BOS between August and December 2009. Links to the web survey were sent via e-mail to station managers and chief pilots for all airlines at BOS. Print copies, along with prepaid return envelopes and a drop-off folder, were also placed in the crew lounges. Participation in the survey was voluntary and the responses were anonymous. Sixty-four survey responses were received, representing most major carriers and one low-cost carrier; however, there was significant representation from 2-3 airlines. Forty-three of the respondents were captains, and 19 were first officers. Thirteen pilots indicated that BOS was their base airport. Half the pilots flew through BOS an average of 5.4 times a week, while the other half only flew through BOS an average of seven times per year. (The overall average was 2.8 times per month.) The average flight experience among the respondents was 22 years, with an average of eight years on their current aircraft.

Because the survey was conducted using a convenience sample, there is potential bias in the survey results: for example, those who are more concerned with fuel conservation are potentially more

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[1] H. Balakrishnan, I. Deonandan, and I. Simaiakis. Opportunities for reducing surface emissions through airport surface movement optimization. Technical report, Massachusetts Institute of Technology, 2008. Technical report Number ICAT-2008-7.

likely to have completed our survey. Nevertheless, the survey yielded useful responses regarding current fuel saving practices, as well as pilots' experiences using single-engine taxi procedures.

General Attitudes towards Fuel Conservation

More than 95% of pilots responding to the survey indicated that fuel conservation is important to them, with 80% indicating that it is very important, and 16% indicating that it is somewhat important. These results are higher than recent studies on conservation and the environment, including studies by the Pew Center on Global Climate Change, Yale University, and George Mason University, which find that Americans' support for conservation ranges from 55% to 80%. However, as mentioned, our results may be biased as a result of our survey method.

Pilots indicated that motivating factors for fuel conservation included general economic and financial concerns, concerns about their airline's profitability, and concerns about the environment and emissions. With fuel accounting for a significant portion of airline operating costs, it is understandable that pilots' interests in fuel conservation are largely driven by economic concerns.

Taxi-out Fuel Burn Estimates

Pilots were asked to estimate the average taxi-out time at their base airports, what they would consider an excessive taxi-out time, and the estimated fuel burn (assuming that all the engines were being used). The results are shown in Table 1. Also included in the table are the average taxi-out times for 2009, as reported by the Aviation System Performance Metrics database.

Based on the survey results, pilots estimated an average (normal) taxi time to be roughly 20 minutes, and excessive taxi times ranged between approximately 30 and 90 minutes. The *additional fuel burn* due to excessive taxi-out times, as estimated by pilots, ranged between 225 and 500 kg per flight, depending on the airport. Applying information on the types of aircraft flown by survey respondents (combining data from the JP Airline Fleet Database and ICAO Engine Emissions Databank[2]), the taxi-out fuel burn for this survey group was estimated to be about 550 kg per flight.

Table 1. Pilots' Estimates of Taxi-out Times and Fuel Burn by Airport

Base Airport	Count	Average taxi-out time from ASPM (min)	Normal taxi-out times, pilot estimates (min)	Taxi-out fuel burn, pilot estimates (kg)	Excessive taxi-out times, pilot opinions (min)
All	59	N/A	20.1	225	41.7
ATL	8	21.8	20.3	252.5	39.4
BOS	9	18.3	13.7	278.6	30.6
EWR	2	25.7	25.0	317.5	67.5
JFK	8	31.1	38.8	437.4	93.1
LGA	2	24.4	32.5	340.2	82.5
LHR	16	N/A	19.5	764.0	32.2

[2] Bucher and Company, JP Airline Fleets International (2006/2007), 2006; ICAO Engine Emissions Databank, Issue 15, 2008.

Operational Practices to Reduce Taxi-out Fuel Burn

Pilots were asked which fuel conservation strategies were encouraged by their airlines during taxi operations, besides single-engine taxi procedures (which were assessed in more depth in the survey). The most common strategies cited were:

- shutting down all engines during long delays
- shutting down, or controlling use of, apus
- minimizing thrust and controlling speed on taxiways
- delaying engine start until engine use is necessary.

Pilots from international carriers noted that at most non-U.S. airports, delays are absorbed at the gate (instead of on the taxiway system), and that they often shut down all engines during gate holds. The majority of both U.S. and international pilots indicated that they shut down all engines during long delays, either at the gate or in airport holding-areas. For example, at Boston Logan Airport, the local air traffic controllers often hold aircraft on certain taxiways depending on the runway configuration being used.

Single-Engine Taxi Procedures

One potential strategy to reduce aircraft surface emissions is the use of single-engine taxi operations; that is, when a single engine is shut down/left off during taxiing on a twin-engine aircraft, or one to two engines are shut down/ left off on a four-engine aircraft. Prior research has indicated that single-engine taxiing can reduce surface emissions by up to 50%[3], although the savings may be lower because of the need to have higher thrust from the engine that is being used, and the fuel needed for cross-bleed starts. The survey respondents thought that single-engine taxiing would result in a 37% reduction in fuel burn, on average.

A majority of survey respondents (70%) indicated that their airlines encourage them to use single-engine taxi procedures, with 40% indicating that they are strongly encouraged to use them, and 31% indicating that they are encouraged. When asked further about the frequency of single-engine taxi use, it was found that these procedures were widely used on arrivals (52% of pilots reported using them more than 75% of the time), while they were infrequently used on departures (54% of pilots reported using them less than 10% of the time).

Operational Challenges Associated with Single-Engine Taxiing

Although single-engine taxiing may appear to be a simple and effective method to reduce fuel burn during surface operations, there are a number of perceived problems associated with the procedure. The four main challenges identified by respondents were:

- excessive thrust and associated issues
- maneuverability problems, particularly related to tight taxiway turns and weather
- problems starting the second engine
- distractions and workload issues

Given that there are maneuverability concerns associated with single-engine taxi procedures, we asked pilots if there are certain conditions under which single-engine taxi procedures were not used. As expected, many pilots indicated that they would not use single-engine taxi procedures with low visibility or tight taxiway turns (due to problems turning into the operating engine). However,

[3] V. Kumar, L. Sherry, and T. Thompson, "Analysis of Emissions Inventory for 'Single-Engine Taxi-Out' Operations," Proceedings International Conference on Research in Air Transportation (ICRAT-2008), Fairfax, VA, February 2008.

nearly half of the pilots surveyed indicated that they would use single-engine taxiing on wet taxiways.

Cold starts did not appear to be a significant factor affecting use of single-engine taxi procedures. A majority of pilots (67%) indicated that if they were departing in the morning after their aircraft had been sitting idle overnight, it would not affect their decision to use single-engine taxiing.

Survey respondents were asked to list any other conditions when they would not use single-engine taxi procedures. The most frequent responses were:

- ice or snow
- high gross weight
- short taxi-times, uncertainty of departure time and position in the takeoff queue, and changes in runway assignments
- hot days on asphalt surfaces

Engine Shutdown Procedures

Based on their airline and equipment flown, a majority of pilots (80%) shut down or leave off a specific engine when utilizing single engine taxi procedures. Although many pilots cited "procedure" or "habit" as their primary reason for shutting down or leaving off a specific engine during single engine taxiing, it is also driven by which engines power essential aircraft systems such as hydraulics and brakes.

Other key considerations include which side the cargo doors are on, aircraft cooling, and the taxiway configuration at the airport (e.g. how many right or left turns will the aircraft need to make during taxi-out or taxi-in).

On departures, pilots wait until an average of 4.6 minutes before takeoff before starting the last engine, and 3.1 minutes after landing to shut down an engine.

Runway Configuration Issues

One of the key reasons that pilots might not use single-engine taxi procedures is that they might anticipate a short taxi-out or taxi-in time. Most pilots indicated that in order to consider using single-engine taxiing for arrivals, the expected taxi-in time would have to exceed 10 minutes (on average); for departures, they would need to expect their taxi time to exceed 20 minutes. For example, at Boston Logan Airport, pilots indicated that they do not typically use single-engine taxi-out procedures to runways 9, 4L, and 15R, which are closest to the gates. The most common reason cited for not using single-engine taxiing at BOS was the proximity of the gate to the runway, and the resultant short taxi time. However, there were other reasons cited for not using the procedure, including:

- length of queue
- complex layout
- busy taxiway areas

Advanced Queue Management Strategies and a Willingness to Wait

Researchers at MIT are currently investigating advanced queue management strategies that would minimize surface fuel burn and emissions. Such strategies might hold aircraft at the gate or in holding areas in order to minimize taxi time, while also aiming to minimize delay. When pilots were asked whether they would be willing to wait at the gate if their position in a takeoff queue could be

guaranteed, 61% indicated that they would *definitely* be willing to wait, and an additional 16% indicated that they would *probably* be willing to wait.

Conclusions

A majority of pilots responding to this survey believe fuel conservation is an important issue, and that this belief is primarily motivated by concerns about the cost of fuel, company profitability, and the impact of aviation on the environment. A majority of airlines appear to encourage single-engine taxi procedures, as well as a variety of other fuel conservation measures.

The survey found that a majority of pilots used single-engine taxi procedures on arrival at airports, while a fewer number of them used single-engine taxi on departures. Key reasons cited for not using these procedures were either safety-related, or associated with practical reasons (such as short taxi distances for some runways at BOS). Single-engine taxi procedures differed between aircraft in terms of which engines were left off, and for how long. Even though this survey was based on a convenience sample, it provided some useful insights regarding airline pilots' attitudes to fuel consumption, as well as information on the use of fuel conservation measures such as single-engine taxiing.

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